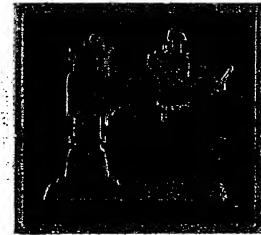


2

# DRILLING AND BORING MACHINES



VSESTOJUZNOJE EXPORTNO-IMPORTNOJE OBJEDINENIJE

**STANKOIMPORT**

# DRILLING AND BORING MACHINES

BENCH DRILLING MACHINES  
VERTICAL DRILLING MACHINES  
RADIAL DRILLING MACHINES  
JIG BORING MACHINES  
HORIZONTAL BORING, DRILLING AND  
MILLING MACHINES  
PRECISION BORING MACHINES

VSESOJUZNOJE EXPORTNO-IMPORTNOJE OBJEDINENIJE

STANKOIMPORT

U S S R

MOSCOW

This catalogue contains short specifications of the most common types of machine tools exported by the Vsesojuznoje Exportno-Importnoje Objedinenije "Stankoimport".

Detailed pamphlets sent on request.

All inquiries and correspondence to be forwarded to:

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Moscow, USSR  
For cables: Stankoimport Moscow  
Phone: G4-21-32

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The Machine Tools produced in the U.S.S.R. are outstanding for their high efficiency, convenience and safety in operation and long service.

The first class material, perfect modern design and skilful workmanship provide accuracy, high efficiency and durability of the Machine Tools.

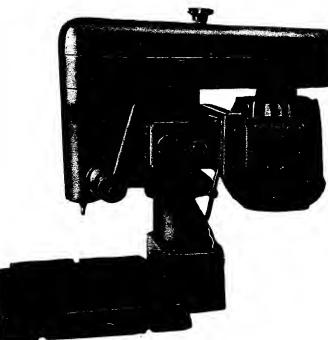
Steady improvement of machine tool design in the U.S.S.R. aims at the increase of productivity, accuracy, reliability and dependability of machine in operation, as well as the reduction of operator's fatigue by improving and convenient placing of all operating controls and the all-increasing automatization of operation.

The Vsesojuznoje Exportno-Importnoje Objedinenie "Stankoinport" is able to offer a wide range of Machine Tools both universal and special types including Automatic Transfer Machines and Automatic Workshops.



## HIGH SPEED BENCH DRILLING MACHINE

MODEL 2A106



The 2A106 High Speed Bench Drilling Machine has been designed for the drilling of small diameter holes efficiently, and with the highest degree of accuracy.

6 spindle speeds are obtained by shifting the belt to various of the 3 step cone pulleys.

The spindle feed is hand operated and extremely sensitive.

The machine is fitted with a depth stop, quickly adjustable to any desired depth within its capacity.

The machine is equipped with a separate electric motor.

### SPECIFICATIONS

Capacity	Distance, end of spindle to base, mm:	
Maximum drill diameter, mm .....	6	minimum ..... 25
Distance, center of spindle to column, mm .....	125	maximum ..... 200

Working surface of base, mm ..... 250×250

— СТАНКОИМПОРТ —

**Spindle**  
Taper in spindle . . Morse No.1a (shortened)  
Spindle speeds, r.p.m. . . 1545; 2900; 4500;  
7400; 11050; 15000  
**Drive**  
220/380 volt, 3 phase, 50 cycle A.C.  
motor:

power, kW . . . . .	0.6
speed, r.p.m. . . . .	3000

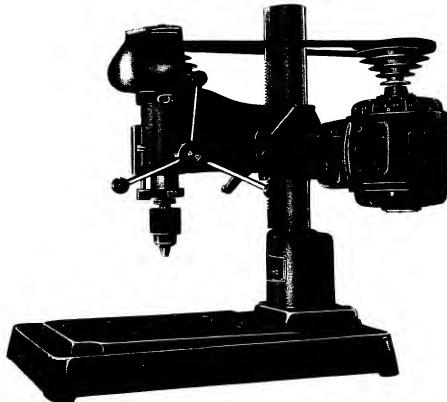
**Space Occupied**  
Floor space, mm. . . . . 615×360  
Height of machine, mm. . . . . 700

<b>Weight</b>	
Net weight, kg . . . . .	approx. 82



## BENCH DRILLING MACHINE

MODEL HC-12A



The HC-12A Bench Drilling Machine is designed for the drilling of small diameter holes.

5 spindle speeds are obtained by shifting the belt to various steps of the pulleys.

The spindle feed is hand operated and extremely sensitive.

The machine is fitted with a depth stop, quickly adjustable to any desired depth within its capacity.

The machine is equipped with a separate electric motor.

СТАНКОИМПОРТ

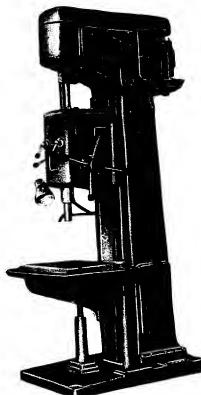
СТАНКОИМПОРТ

**SPECIFICATIONS**

<b>Capacity</b>	<b>Drive</b>
Maximum drill diameter, mm ..... 12	220/380 volt, 3 phase, 50 cycle A.C.
Distance, center of spindle to column, mm ..... 175	motor:
..... mm ..... 20	power, kW ..... 0.65
Distance, end of spindle to base, mm: minimum ..... 20	speed, r.p.m. ..... 1500
maximum ..... 420	
Working surface of base, mm ..... 360×360	
<b>Spindle</b>	
Taper in spindle, Morse No.2b (shortened)	
Maximum travel of spindle, mm ..... 100	
Number of spindle speeds ..... 5	
Range of spindle speeds, r.p.m. ..... 450—4500	Weight
	Net weight, kg ..... approx. 120

**VERTICAL DRILLING MACHINE**

MODEL 2A125



The 2A125 Vertical Drilling Machine is designed for drilling, boring, reaming, facing and tapping operations. 9 spindle speeds and 9 feeds are obtained through speed and gear boxes. The automatic feed is engaged and disengaged by turning the hand-feed wheel. During the automatic feed the spindle can be fed manually.

The feed mechanism is provided with automatic overload release. The predetermined depth of drilling is limited by dial stops which automatically trip the feed. The spindle rotation is reversed also by means of a dial stop.

— СТАНКОИМПОРТ —

— СТАНКОИМПОРТ —

All controls and levers are grouped within convenient reach from the operator's working position. Special attention has been paid to lubrication. All main parts of the machine are lubricated automatically.

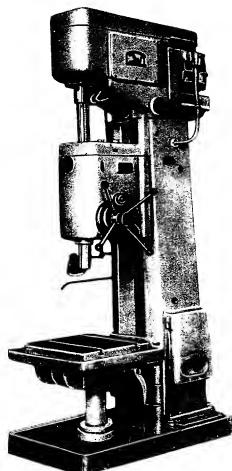


#### SPECIFICATIONS

Capacity	Speeds and Feeds
Maximum drill diameter in steel of 50–60 kg/mm <sup>2</sup> tensile strength, mm	25 Number of spindle speeds ..... 9
Distance, end of spindle to table, mm:	Range of spindle speeds, r.p.m. .... 96–1360
minimum ..... 0 Number of spindle feeds ..... 9	Range of spindle feeds, mm per revolution ..... 0.1–0.81
maximum ..... 700	
Distance, end of spindle to base, mm:	
minimum ..... 750	220/380 volt, 3 phase, 50 cycle A.C. motors:
maximum ..... 1100	Spindle drive: power, kW ..... 2.8 speed, r.p.m. .... 1500
Distance, center of spindle to column, mm ..... 250	Coolant pump: power, kW ..... 0.1 speed, r.p.m. .... 3000
<b>Table</b>	
Working surface of table, mm ... 500×375	Space Occupied
Maximum vertical travel of table, mm 325	Floor space, mm ..... 980×825
<b>Spindle</b>	
Taper in spindle Morse No.3	Height of machine, mm ..... 2300
Maximum vertical spindle travel, mm 175	<b>Weight</b>
Vertical spindle head adjustment, mm 200	Net weight, kg ..... approx. 925

#### VERTICAL DRILLING MACHINE

MODEL 2A135



The 2A135 Vertical Drilling Machine is designed for drilling, boring, reaming, facing and tapping operations. 9 spindle speeds and 11 feeds are obtained through speed and feed gear boxes. The automatic feed is engaged and disengaged by turning the hand-feed wheel. During the automatic feed the spindle can be fed manually. The feed mechanism is provided with automatic overload release. The predetermined depth of drilling is limited by dial stops which automatically trip the feed. The spindle rotation is reversed also by means of a dial stop.

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All controls and levers are grouped within convenient reach from the operator's working position.  
The machine is equipped with two motors.

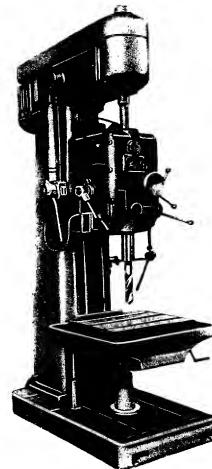
## SPECIFICATIONS

Capacity	Speeds and Feeds	
Maximum drill diameter in steel of 50—60 kg/m <sup>2</sup> tensile strength, mm	35	Number of spindle speeds ..... 9 Range of spindle speeds, r.p.m. .... 68—1100
Distance, end of spindle to table, mm:		Number of spindle feeds ..... 11 Range of spindle feeds, mm per
minimum ..... 0		revolution ..... 0.115—1.6
maximum ..... 750		
Distance, end of spindle to base, mm:		
minimum ..... 705	220/380 volt, 3 phase, 50 cycle A.C. motors:	
maximum ..... 1130	Spindle drive: power, kW ..... 4.5 speed, r.p.m. .... 1500	
Distance, center of spindle to column, mm ..... 300	Coolant pump: power, kW ..... 0.1 speed, r.p.m. .... 3000	
<b>Table</b>	<b>Space Occupied</b>	
Working surface of table, mm ..... 450×500	Floor space, mm ..... 1240×810	
Maximum vertical travel of table, mm ..... 325	Height of machine, mm ..... 2560	
<b>Spindle</b>	<b>Weight</b>	
Taper in spindle ..... Morse No. 4	Net weight, kg ..... approx. 1525	
Maximum vertical spindle travel, mm ..... 225		
Vertical spindle head adjustment, mm ..... 200		



## VERTICAL DRILLING MACHINE

MODEL 2A150



The 2A150 Vertical Drilling Machine is designed for drilling, boring, reaming, facing and tapping operations.

12 spindle speeds and 9 feeds are obtained through speed and feed gear boxes.

The automatic feed is engaged and disengaged by turning the hand-feed wheel. During the automatic feed the spindle can be fed manually. The feed mechanism is provided with automatic overload release.

— СТАНКОИМПОРТ —

— СТАНКОИМПОРТ —

The predetermined depth of drilling is limited by dial stops which automatically trip the feed. All controls and levers are grouped within convenient reach from the operator's working position.

Special attention has been paid to lubrication. All main parts of the machine are lubricated automatically. The machine is equipped with two motors.

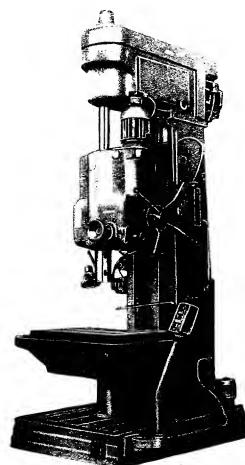
#### SPECIFICATIONS

Capacity	Spindle	Speeds and Feeds
Maximum drill diameter in steel of 50—60 kg/mm <sup>2</sup> tensile strength, mm	50	Number of spindle speeds ..... 12 Range of spindle speeds, r.p.m. .... 32—1400
Distance, end of spindle to table, mm:		Number of spindle feeds ..... 9 Range of spindle feeds, mm per
minimum ..... 0		revolution ..... 0.12—2.64
maximum ..... 800		
Distance, end of spindle to base, mm:		
minimum ..... 650	Drive	
maximum ..... 1200	220/380 volt, 3 phase, 50 cycle A.C. motors:	
Distance, center of spindle to column, mm ..... 350	Spindle drive: power, kW ..... 7 speed, r.p.m. .... 1500	
Table	Coolant pump:	
Working surface of table, mm ..... 500×600	power, kW ..... 0.1 speed, r.p.m. .... 3000	
Maximum vertical travel of table, mm	Space Occupied	
325	Floor space, mm ..... 1550×970	
Spindle	Height of machine, mm ..... 2865	
Taper in spindle ..... Morse No.5	Weight	
Maximum vertical spindle travel, mm	Net weight, kg ..... approx. 2250	
300		
Vertical spindle head adjustment, mm		
250		



#### VERTICAL DRILLING MACHINE

MODEL 2170



The 2170 Vertical Drilling Machine is designed for drilling, boring, counterboring, reaming and facing operations.

12 spindle speeds and 9 spindle head feeds are obtained through speed and feed gear boxes. The spindle is mounted in a sliding head which moves together with the spindle along the column ways.

The working cycle of the machine is completely automatic. The automatic cycle consists of sliding head rapid traverse down (approach), feed and rapid return. The rapid down and up movements of the sliding head are

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effected by a separate electric motor. The lengths of rapid traverse and feed are controlled by repositioning suitable depth stops. The machine is equipped with three motors.

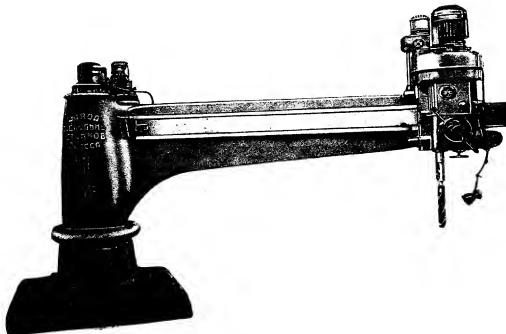
#### SPECIFICATIONS

<b>Capacity</b>		Number of sliding head feeds ..... 9
Maximum drill diameter in steel of 50—60 kg/mm <sup>2</sup> tensile strength, mm	75	Range of sliding head feeds, mm per revolution of spindle ..... 0.15—3.2
Distance, end of spindle to table, mm: minimum ..... 0		Rapid approach and return speed of sliding head, m/min ..... 3
maximum ..... 850		
Distance, end of spindle to base, mm: minimum ..... 800		
maximum ..... 1300		
Distance, center of spindle to column, mm ..... 400		
<b>Table and Base</b>		Drive
Working surface of table, mm ..... 600×750		220/380 volt, 3 phase, 50 cycle A.C. motors:
Maximum vertical travel of table, mm ..... 350		Spindle drive: power, kW ..... 1.0 speed, r.p.m ..... 3000
Working surface of base, mm ..... 600×720		Rapid sliding head traverse: power, kW ..... 1.0 speed, r.p.m ..... 3000
<b>Spindle and Sliding Head</b>		Coolant pump: power, kW ..... 0.25 speed, r.p.m ..... 3000
Taper in spindle ..... Morse No.6		
Maximum travel of sliding head, mm ..... 500		
<b>Speeds and Feeds</b>		<b>Space Occupied</b>
Number of spindle speeds ..... 12		Floor space, mm ..... 1630×1220
Range of spindle speeds, r.p.m. ..... 22—1018		Height of machine, mm ..... 3230
		<b>Weight</b>
		Net weight, kg ..... approx. 3600



#### RADIAL DRILLING MACHINE

MODEL 2153



The 2153 Radial Drilling Machine is designed for drilling a great number of holes in metal sheets and in structural shapes as well as for tapping these holes.

19 different spindle speeds and 18 spindle feeds are obtained through speed and feed gear boxes.

The spindle has both forward and reverse motions.

The spindle feed can be operated either by power or manually.

The traverse of the spindle head along the arm, clamping the spindle head and the swing of the arm around the column axis are accomplished manually.

The locking and unlocking of the arm on the column is obtained by hydraulic means.

The machine is equipped with three motors.

The model's design of the machine, its rigidity, high spindle speeds, together with the wide range of speeds and feeds provide for the effective application of the machine in boiler and metal structure works.

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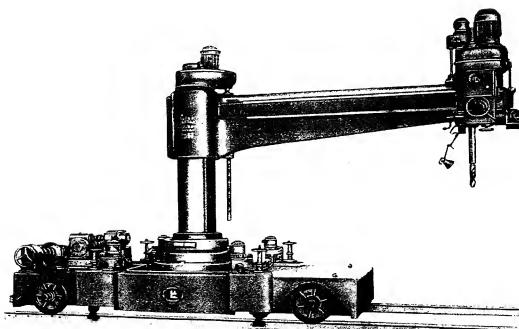
**SPECIFICATIONS**

<b>Capacity</b>	
Maximum drill diameter in mild steel, mm	35
Distance, center of spindle to cylindrical part of arm (throat), mm:	
maximum	380
minimum	3000
Distance, end of spindle to floor, mm:	
minimum	1000
maximum	1350
<b>Spindle and Spindle Head</b>	
Taper in spindle	Morse No.5
Maximum vertical spindle travel (by power and manually), mm	350
Maximum traverse of spindle head on arm, mm	2620
<b>Arm</b>	
Maximum swing of arm	360°
<b>Speeds and Feeds</b>	
Number of spindle speeds	19
Range of spindle speeds, r.p.m.	30—1700
Number of spindle feeds	18
Range of spindle feed, mm per revolution	0.03—1.2
<b>Drive</b>	
220/380volt, 3 phase, 50 cycle A.C. motors:	
Spindle drive:	
power, kW	4.5
speed, r.p.m.	1500
Hydraulic arm clamping:	
power, kW	0.6
speed, r.p.m.	1500
Coolant pump:	
power, kW	0.1
speed, r.p.m.	3000
<b>Space Occupied</b>	
Floor space, mm	4640×1500
Height of machine, mm	2920
<b>Weight</b>	
Net weight, kg	approx. 6000



## TRAVELLING RADIAL DRILLING MACHINE

MODEL 2Д53



The 2Д53 Travelling Radial Drilling Machine has been designed for drilling, boring and reaming on large rivet joint and bridge girder assemblies. The machine is mounted on a rigid bogie, arranged on four wheels, which move along railway of standard gauge by means of a separate motor. While the machine is in operation the bogie is securely clamped on the rails by hydraulic means through separate electric motors.

19 different spindle speeds and 18 spindle feeds are obtained through speed and feed gear boxes. The spindle has both forward and reverse motions. The spindle feed can be operated either by power or manually.

The spindle head traverse and clamping on the arm are effected manually.

The elevating and lowering motion of the arm is operated by a separate motor. When starting the raising or lowering movements of the arm on the column the arm clamp is released automatically and when stopping these movements the arm is clamped automatically.

The swing of the arm around the column axis is accomplished manually.

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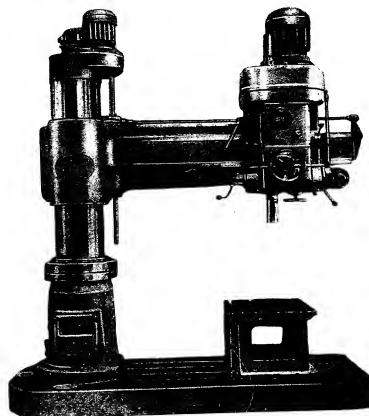
— СТАНКОИМПОРТ —

**SPECIFICATIONS**

<b>Capacity</b>		Range of spindle speeds, r.p.m. ....	30—1700
Maximum drill diameter in mild steel, mm ..... 35		Number of spindle feeds .....	18
Distance between spindle center and railway gauge center (radius of drilling), mm:		Range of spindle feeds, mm per revolution ..... 0.03—1.2	
minimum ..... 1000		Arm traverse speed, m/min. .... 0.75	
maximum ..... 2400		Speed of bogie, m/min. .... 10	
Maximum distance center of spindle to column, mm ..... 3150			
Distance, end of spindle to top of rail, mm:			
minimum ..... 900		220/380 volt, 3 phase, 50 cycle A.C. motors:	
maximum ..... 2300		Spindle drive: power, kW ..... 4.5 speed, r.p.m. .... 1500	
Distance between rail axes, mm ..... 1592		Arm traverse: power, kW ..... 2.8 speed, r.p.m. .... 1500	
Type of rail ..... P 38/I-a according to GOST 3542-47		Bogie traverse: power, kW ..... 1.7 speed, r.p.m. .... 1000	
<b>Spindle and Spindle Head</b>		Hydraulic pump (5 motors): power, kW ..... 0.6 speed, r.p.m. .... 1500	
Taper in spindle ..... Morse No. 5		Coolant pump: power, kW ..... 0.1 speed, r.p.m. .... 3000	
Maximum vertical movement of spindle (by power and manually), mm ..... 350			
Maximum traverse of spindle head on arm, mm ..... 2400			
<b>Arm</b>			
Maximum vertical travel of arm, mm 1050		<b>Space Occupied</b>	
Maximum swing of arm ..... 360°		Floor space, mm ..... 4865×4300	
Number of spindle speeds ..... 19		Height of machine, mm ..... 3940	
<b>Weights</b>			
Net weight, kg ..... approx. 19000			

**RADIAL DRILLING MACHINE**

MODEL 255



The 255 Radial Drilling Machine is designed for drilling, boring, counter-boring, reaming, facing and tapping operations. 19 different spindle speeds and 18 spindle feeds are obtained through speed and feed gear boxes.

The spindle has both forward and reverse motions, power feed and rapid hand traverse. The reverse of the spindle is effected through a multiple disc clutch or through a reversing motor.

The elevating and lowering motion of the arm is operated by a separate electric motor.

The locking and unlocking of the arm on the column and of the spindle head on the arm are obtained by hydraulic means. When starting the

— СТАНКОИМПОРТ —

— СТАНКОИМПОРТ —

raising or lowering movements of the arm on the column the arm clamp is released automatically and when stopping these movements the arm is clamped automatically. The traverse of the spindle head along the arm and the swing of the arm around the column axis are accomplished manually.

All controls and levers are grouped on the spindle head within easy reach of the operator.

The machine is equipped with four motors.

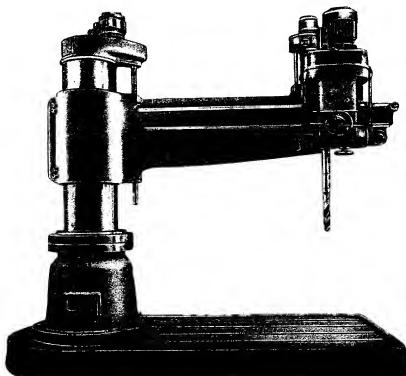
#### SPECIFICATIONS

<b>Capacity</b>		<b>Range of spindle speeds, r.p.m.:</b>
Maximum drill diameter in mild steel, mm .....	50	forward ..... 30—1700 reverse ..... 34—1700
Distance, center of spindle to column, mm .....		Number of spindle feeds ..... 18
minimum ..... 450		Range of spindle feeds, num per revolution ..... 0.03—1.2
maximum ..... 1500		
Distance, end of spindle to table, mm: minimum ..... 0		220/380 volt, 3 phase, 50 cycle A.C. motors:
maximum ..... 1000		Spindle drive: power, kW ..... 4.5 speed, r.p.m. ..... 1500
Distance, end of spindle to base, mm: minimum ..... 470		Elevating and lowering arm motions: power, kW ..... 1.7 speed, r.p.m. ..... 1500
maximum ..... 1500		Arm clamping: power, kW ..... 0.6 speed, r.p.m. ..... 1500
Working surface of base, mm .. 780×1545		Constant pressure: power, kW ..... 0.1 speed, r.p.m. ..... 3000
<b>Spindle and Spindle Head</b>		
Taper in spindle ..... Morse No. 5		
Maximum vertical spindle travel, mm ..... 350		
Maximum traverse of spindle head on arm, mm ..... 1050		
<b>Arm</b>		
Maximum traverse of arm on column, mm ..... 680		<b>Space Occupied</b>
Maximum swing of arm ..... 360°		Floor space, mm ..... 2500×970 Height of machine, mm ..... 3350
<b>Speeds and Feeds</b>		
Number of spindle speeds ..... 19		<b>Weight</b>
		Net weight, kg ..... approx. 4200



#### RADIAL DRILLING MACHINE

MODEL 2B55



The 2B55 Radial Drilling Machine is designed for drilling, boring, counterboring, reaming, facing and tapping operations.

19 different spindle speeds and 18 spindle feeds are obtained through speed and feed gear boxes.

The spindle has both forward and reverse motions, the reverse of the spindle being effected through either a driving clutch or reversing motor.

The spindle feed is operated both by power and manually.

The elevating and lowering motion of the arm is operated by a separate electric motor.

The locking and unlocking of the arm on the column and of the spindle head on the arm are obtained by hydraulic means. When starting raising or lowering movements of the arm on the column the arm clamp is released automatically and when stopping these movements the arm is clamped automatically.

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СТАНКОИМПОРТ

The traverse of the spindle head along the arm and the swing of the arm around the column axis are accomplished manually.  
All controls and levers are grouped on the spindle head within easy reach of the operator. The machine is equipped with four motors.

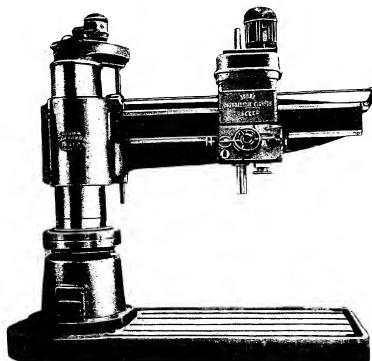
## SPECIFICATIONS

Capacity		Range of spindle speeds, r.p.m. . . . .	30—1700
Maximum drill diameter in mild steel, mm . . . . .	50	Number of spindle feeds . . . . .	18
Distance, center of spindle to column, mm:		Range of spindle feeds, mm per revolution . . . . .	0.03—1.2
minimum . . . . .	500		
maximum . . . . .	2000		
Distance, end of spindle to table, mm:		Drive	
minimum . . . . .	100	220/380 volt, 3 phase, 50 cycle A.C. motors:	
maximum . . . . .	1150	Spindle drive:	
Distance, end of spindle to base, mm:		power, kW . . . . .	4.5
minimum . . . . .	700	speed, r.p.m. . . . .	1300
maximum . . . . .	1750	Elevating and lowering arm motions:	
Working surface of base, mm . . . . .	1300×2065	power, kW . . . . .	2.8
Spindle and Spindle Head		speed, r.p.m. . . . .	1500
Taper in spindle . . . . .	Morse No. 5	Arm and spindle head clamping:	
Maximum vertical spindle travel, mm . . . . .	350	power, kW . . . . .	0.6
Maximum traverse of spindle head on arm, mm . . . . .	1500	speed, r.p.m. . . . .	1500
Space Occupied		Coolant pump:	
Maximum traverse of arm on column, mm . . . . .	700	power, kW . . . . .	0.1
Maximum swing of arm . . . . .	360°	speed, r.p.m. . . . .	3000
Weights			
Number of spindle speeds . . . . .	19	Net weight, kg . . . . .	approx. 9600



## RADIAL DRILLING MACHINE

MODEL 257



The 257 Radial Drilling Machine is designed for drilling, boring, counterboring, reaming, facing and tapping operations.

22 different spindle speeds and 18 spindle feeds are obtained through speed and feed gear boxes. The spindle has both forward and reverse motions, the reverse of the spindle being effected through a driving clutch. The spindle feed is operated both by power and manually.

A hydraulic single lever pre-selecting speed and feed changing system gives rapid changes from any one speed or feed in the range to any other during the operation of the machine.

The elevating and lowering motion of the arm is operated by a separate electric motor.

The locking and unlocking of the arm on the column and of the spindle head on the arm are obtained by hydraulic means. When starting the raising or lowering movements of the arm on the column the arm clamp is released

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automatically and when stopping these movements the arm is clamped automatically.

The traverse of the spindle head along the arm and the swing of the arm around the column axis are accomplished manually.

The machine is equipped with four motors.

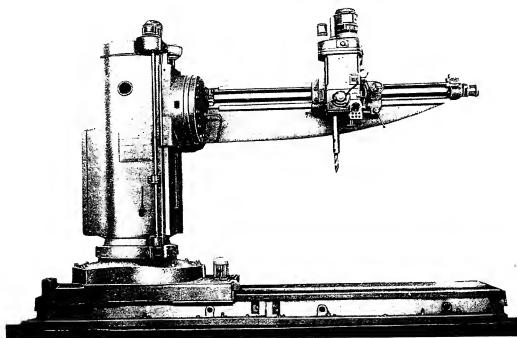
#### SPECIFICATIONS

<b>Capacity</b>		Range of spindle speeds, r.p.m. 11.2-1400 Number of spindle feeds ..... 18 Range of spindle feeds, mm per revolution ..... 0.037-2
Maximum drill diameter in mild steel, mm .....	75	
Distance, center of spindle to column, mm:		
minimum ..... 500		
maximum ..... 2000		
Distance, end of spindle to table, mm:		220/380 volt, 3 phase, 50 cycle A.C. motors:
minimum ..... 0		Spindle drive: power, kW ..... 7 speed, r.p.m. ..... 1500
maximum ..... 1150		Elevating and lowering arm motions: power, kW ..... 1.500 speed, r.p.m. ..... 1500
Distance, end of spindle to base, mm:		Arm and spindle head clamping: power, kW ..... 0.6 speed, r.p.m. ..... 1500
minimum ..... 600		Coolant pump: power, kW ..... 0.1 speed, r.p.m. ..... 3000
maximum ..... 1750		
Working surface of base, mm .....	1300×2065	
<b>Spindle and Spindle Head</b>		<b>Space Occupied</b>
Taper in spindle .....	Morse No. 6	Floor space, mm ..... 3600×1550
Maximum vertical spindle travel, mm .....	450	Height of machine, mm ..... 3875
Maximum traverse of spindle head on arm, mm .....	1500	
<b>Arm</b>		<b>Weight</b>
Maximum traverse of arm on column, mm .....	700	Net weight, kg ..... approx. 10600
Maximum swing of arm .....	360°	
<b>Speeds and Feeds</b>		
Number of spindle speeds .....	22	



#### UNIVERSAL RADIAL DRILLING MACHINE

MODEL 2II57



The 2II57 Universal Radial Drilling Machine has been designed for drilling, boring, reaming, tapping and spot facing on large or awkward work. Angular, vertical and horizontal holes of any casting or welded assemblies may be quickly and easily machined with the machine.

For angular drilling both the arm and the spindle head can be swivelled in vertical planes.

The radial arm is of strong section and is accurately fitted to the column slides. The column base slides easily on the machine bed and can be rigidly locked in any position on the bed.

21 different spindle speeds and 18 spindle feeds are obtained through speed and feed gear boxes.

The spindle has both forward and reverse motions; the reverse of the spindle being effected through either a driving clutch or reversing motor. The spindle feed can be operated either by power or manually. The spindle head can be traversed along the arm both by power and manually.

All the locking, unlocking and traverse movements of the machine are operated by power; unclamping, swiveling and clamping of spindle head,

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as well as clamping and unclamping of arm when swiveling are accomplished manually. The machine is equipped with nine motors.

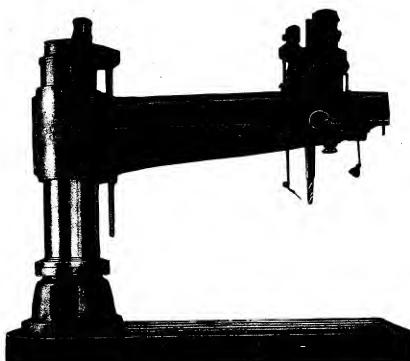
#### SPECIFICATIONS

Capacity	Drive
Maximum drill diameter in mild steel, mm .....	220/380 volt, 3 phase, 50 cycle A.C. motors:
mm .....	Spindle, kW ..... 14
Distance, spindle center to column ways, mm: minimum ..... 950 maximum ..... 3450	speed, r.p.m. ..... 1500
Distance, end of spindle to floor, mm: minimum ..... 1215 maximum ..... 3185	Spindle head traverse: power, kW ..... 1 speed, r.p.m. ..... 1500
Maximum traverse of column on bed, mm ..... 4000	Spindle head clamping: power, kW ..... 0.6 speed, r.p.m. ..... 1500
<b>Spindle and Spindle Head</b>	Arm traverse on column: power, kW ..... 4.5 speed, r.p.m. ..... 1500
Taper in spindle ..... Morse No. 6	Arm swivel: power, kW ..... 2.8 speed, r.p.m. ..... 1000
Maximum vertical travel of spindle, mm ..... 500	Column clamping (two motors): power, kW ..... 0.6 speed, r.p.m. ..... 1500
Maximum traverse of spindle head on arm, mm ..... 2500	Column traverse: power, kW ..... 2.8 speed, r.p.m. ..... 1500
Maximum swivel of spindle head ..... $\pm 30^\circ$	Coolant pump: power, kW ..... 0.15 speed, r.p.m. ..... 3000
<b>Arm</b>	<b>Space Occupied</b>
Maximum vertical travel of arm, mm 1550	Front space, mm ..... 6770 $\times$ 1730
Maximum swivel of arm in vertical plane ..... $\pm 90^\circ$	Height of machine, mm ..... 4940
Maximum swing of arm ..... $360^\circ$	<b>Weight</b>
<b>Speeds and Feeds</b>	Net weight, kg ..... approx. 35000
Number of spindle speeds ..... 21	
Range of spindle speed, r.p.m. .... 9—1000	
Number of spindle feeds ..... 18	
Range of spindle feeds, mm per revolution ..... 0.1—2.12	



#### RADIAL DRILLING MACHINE

MODEL 258



The 258 Radial Drilling Machine is designed for drilling, boring, counterboring, reaming, facing and tapping operations.

21 spindle speeds and 18 spindle feeds are obtained through speed and feed gear boxes.

The spindle has both forward and reverse motions, the reverse of the spindle being effected through either a driving clutch or reversing motor.

The spindle feed is operated both by power and manually.

The elevating and lowering motion of the arm is operated by a separate electric motor.

The locking and unlocking of the arm on the column and of the spindle head on the arm are obtained by hydraulic means. When starting the raising or lowering movements of the arm on the column the arm clamp is released automatically and when stopping these movements the arm is clamped automatically.

The spindle head is traversed along the arm by either a hydraulic motor or manually.

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The swing of the arm around the column is accomplished manually.  
The machine is equipped with five motors.

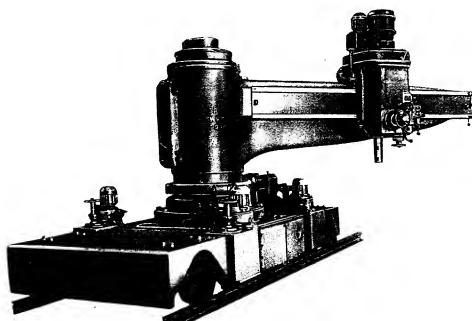
#### SPECIFICATIONS

Capacity		Number of spindle feeds .....	18
Maximum drill diameter in mild steel,	mm:	Range of spindle feeds, mm per	
.....	.....	revolution .....	0.1—2.12
Distance, center of spindle to column,	mm:		
minimum .....	500	220/380 volt, 3 phase, 50 cycle A.C. motors:	
maximum .....	3000	Spindle drive:	
Distance, end of spindle to table, mm:	mm:	power, kW .....	14
minimum .....	150	speed, r.p.m. ....	1500
maximum .....	2000	Elevating and lowering arm motions:	
Distance, end of spindle to base, mm:	mm:	power, kW .....	2.8
minimum .....	750	speed, r.p.m. ....	1500
maximum .....	2600	Arm clamping:	
Working surface of base, mm .....	1480×3175	power, kW .....	0.6
Spindle and Spindle Head		speed, r.p.m. ....	1500
Taper in spindle .....	Morse No. 6	Spindle head traverse and clamping:	
Maximum vertical spindle travel, mm	500	power, kW .....	0.6
Maximum traverse of spindle head on		speed, r.p.m. ....	1500
arm, mm .....	2500	Cooling pump:	
Arm		power, kW .....	0.15
Maximum traverse of arm on column,		speed, r.p.m. ....	3000
mm .....	1350		
Maximum swing of arm .....	360°		
Speeds and Feeds			
Number of spindle speeds .....	21	Space Occupied	
Range of spindle speeds, r.p.m. ....	9—1000	Floor space, mm .....	4865×1730
		Height of machine, mm .....	4800
		Weight	
		Net weight, kg .....	approx. 20000



## TRAVELLING RADIAL DRILLING MACHINE

MODEL 2Д58



The 2Д58 Travelling Radial Drilling Machine has been designed for drilling, boring, reaming, tapping and spot facing on large or awkward work.

The machine is mounted on a rigid bogie, arranged on four wheels, which move along railway of standard gauge by means of a separate motor.

21 different spindle speeds and 18 spindle feeds are obtained through speed and feed gear boxes. The spindle has both forward and reverse motions, the reverse of the spindle being effected through either a driving clutch or reversing motor. The spindle feed can be operated either by power or manually.

The spindle head is traversed along the arm both by power and by hand. The arm is of strong section and can be swung radially through a complete circle.

Clamping of spindle head on arm, locking of outer column on inner one and bogie on rails are obtained by hydraulic means through separate electric motors.

The machine is equipped with nine motors.

СТАНКОИМПОРТ

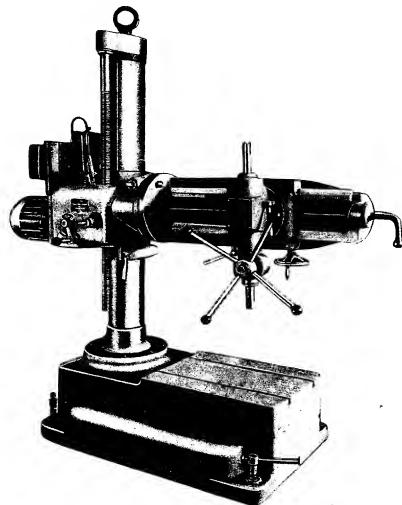
СТАНКОИМПОРТ

**SPECIFICATIONS**

<b>Capacity</b>		Range of spindle speeds, r.p.m. ....	9—1000
Maximum drill diameter in mild steel, mm .....	100	Number of spindle feeds .....	18
Distance between center of spindle and center of railway gauge (radius of drilling), mm:		Range of spindle feeds, mm per revolution .....	0.1—2.12
minimum .....	850	Speed of bogie, mm/min. ....	10
maximum .....	3500		
Distance, end of spindle to top of rail, mm:			
minimum .....	900	220/380 volt, 3phase, 50cycle A.C. motors:	
maximum .....	1400	Spindle drive: power, kW ..... 14 speed, r.p.m. .... 1500	
Distance between rail axes, mm .....	1592	Bogie travel: power, kW ..... 1.7 speed, r.p.m. .... 1000	
Type of rail .... P38/II-a according to GOST 3542-47		Hydraulic pumps (6 motors): power, kW ..... 0.6 speed, r.p.m. .... 1500	
<b>Spindle and Spindle Head</b>		Coolant pump: power, kW ..... 0.1 speed, r.p.m. .... 3000	
Taper in spindle ..... Morse No. 6			
Maximum vertical travel of spindle (by power and manually), mm .... 500			
Maximum traverse of spindle head on arm, mm .....	2650		
<b>Arm</b>			
Maximum swing of arm .....	360°	<b>Space Occupied</b>	
<b>Speeds and Feeds</b>		Floor space, mm ..... 5025×4300	
Number of spindle speeds .....	21	Height of machine, mm ..... 3360	
		<b>Weight</b>	
		Net weight, kg ..... approx. 25000	

**PORTABLE RADIAL DRILLING MACHINE**

MODEL 2A592



The 2A592 Radial Drilling Machine is designed for drilling holes on large or awkward work, where it is inconvenient or difficult to take the work to a machine.

The machine can be readily moved from one portion of the work to another, either by crane or on its own wheels.

**СТАНКОИМПОРТ****СТАНКОИМПОРТ**

Spindle head is of compact design and can be adjusted in vertical plane to any angle. It can be easily traversed along arm by means of hand wheel. Radial arm is accurately fitted to column slide and can be swung radially through a complete circle as well as swivelled in vertical plane to any angle.

The arm can be elevated or lowered by means of screw and nut mechanism.

Secure lock to all motions is provided.

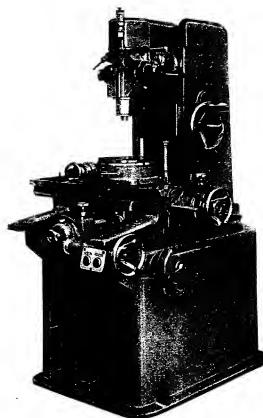
#### SPECIFICATIONS

Capacity	Arm
Maximum drill diameter in mild steel, mm .....	25
Minimum and maximum distance from spindle center line to column, mm .....	395—895
Minimum and maximum distance from face of spindle to base, mm .....	25—870
Working surface of base, mm .....	450×590
<b>Spindle</b>	
Taper in spindle .....	Morse No. 2
Maximum spindle travel (by hand), mm .....	130
Maximum spindle head travel (by hand), mm .....	500
Maximum spindle head swivel .....	360°
<b>Speeds</b>	
Spindle speeds, r.p.m. ..	175; 432; 693; 980
<b>Drive</b>	
220/380 volt, 3 phase, 50 cycle A.C. motor; power, kW .....	1.7
speed, r.p.m. ....	1500
<b>Space Occupied</b>	
Floor space, mm .....	1800×680
Height of machine, mm .....	2000
<b>Weight</b>	
Net weight, kg .....	approx. 780



#### JIG BORING MACHINE

MODEL 2420



The 2420 Jig Boring Machine has been designed for drilling and boring holes in jigs, fixtures, dies, gauges or other special tooling where a high degree of accuracy on center distances between the holes is required.

The machine had built into it every necessary device and control to give it extreme accuracy and speed of operation.

For locating purposes the machine comprises a table movable in the longitudinal direction. This table is mounted on a saddle movable transversely. Both the table and saddle movements can be accomplished either manually or by power.

The vertical spindle head traverse is effected manually. The machine is driven by three speed A.C. motor.

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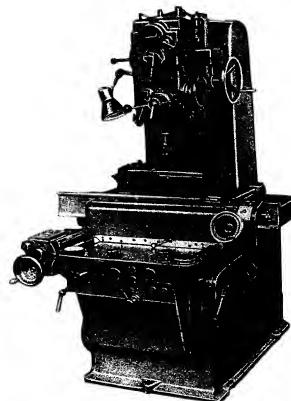
СТАНКОИМПОРТ

**SPECIFICATIONS**

<b>Capacity</b>		<b>Accuracy of table and saddle locations,</b>	
Maximum drill diameter in mild steel, mm .....	10	dial reading .....	0.01
mm .....	40	vernier reading .....	0.001
Maximum diameter of hole bored, mm .....			
Distance, center of spindle to column, mm .....	225	Number of spindle speeds .....	6
Distance, end of spindle to table, mm: minimum .....	40	Range of spindle speeds, r.p.m. ....	140—3200
maximum .....	320	Number of spindle feeds .....	3
		Range of spindle feeds, mm per revolution .....	0.03—0.12
<b>Spindle and Spindle Head</b>		<b>Spindle and Feeds</b>	
Taper in spindle .....	Morse No. 1	Drive	
Maximum vertical travel of spindle (by power and manually), mm .....	100	220/380 volt, 3 phase, 50 cycle A.C. motor (3-speed):	
Maximum vertical travel of spindle head, mm .....	180	power, kW .....	0.7/1.7/2
		speed, r.p.m. ....	750/1500/3000
<b>Table and Saddle</b>		<b>Space Occupied</b>	
Working surface of table, mm .....	400×200	Floor space, mm .....	1015×1125
Maximum longitudinal travel of table (by power and manually), mm .....	320	Height of machine, mm .....	1675
Maximum cross travel of saddle (by power and manually), mm .....	160	Weight	
		Net weight, kg .....	approx. 830

**JIG BORING MACHINE**

MODEL 2430



The 2430 Jig Boring Machine is designed for drilling and boring holes in work pieces where accurate relative location of holes should be observed. It is efficiently used for the production of highly accurate instruments, fixtures and dies.

The machine is of the single column type, the spindle head being traversed vertically, while the rectangular table traverses in longitudinal and cross directions.

Indexing tables are furnished with the machine as a separate attachment.

Measurements of the longitudinal and cross movements of the table are effected by means of dials and a counting mechanism with pre-selective setting which can be arranged during boring.

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The table stops automatically in the preliminary determined position by means of an inductive pick-up unit.

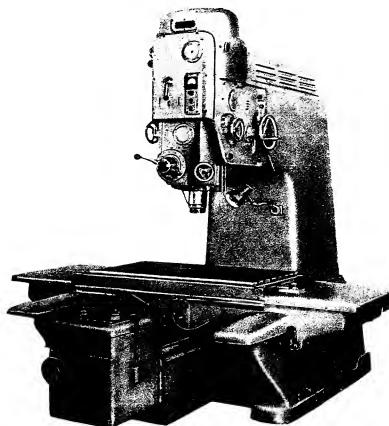
#### SPECIFICATIONS

Capacity		Range of spindle speeds, r.p.m. ....	145—2900
Working surface of table, mm	.....	Number of spindle feeds .....	6
Maximum table traverse, mm:		Range of spindle feeds, mm per revolution of spindle .....	0.025—0.25
longitudinal .....	400		
cross .....	250		
Distance, spindle axis to column, mm	.....	Power of electric motor, kW ....	0.7/1.7/2
Minimum and maximum distance from spindle nose to table surface, mm .....	95—420	Space Occupied	
Taper in spindle .....	Morse No. 2	Floor space, mm .....	1460×1500
Spindle and feed weights		Height of machine, mm .....	2060
Number of spindle speeds .....	6	Weight	
		Net weight, kg .....	approx. 2300



#### JIG BORING MACHINE

MODEL 2450



The 2450 Jig Boring Machine has been designed for drilling and boring holes in jigs, fixtures, dies, gauges or other special tooling where a high degree of accuracy on center distances between the holes is required. Finish milling operations can be performed in this machine as well. The machine has built into it every necessary device and control to give it extreme accuracy and speed of operation.

One of the outstanding features of this machine is its micro-optical measuring device. This arrangement gives the following advantages:  
The table locations are done with the highest precision;

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The moving parts of table and saddle are free from any measuring functions and therefore do not influence on the measuring accuracy of the machine.

The measuring parts of the device are not subjected to any mechanical strain and retain their accuracy during the entire life of the machine.

For locating purposes the machine comprises a table movable in the longitudinal direction. This table is mounted on a saddle movable transversely. Both the table and saddle movements can be accomplished either manually or by power.

The spindle is driven by a D.C. variable speed motor through a speed gear box.

Both the spindle speed and feed are stepless variable.

The vertical spindle head traverse is effected manually.

The machine is equipped with four motors. The D.C. motors are fed from a motor-generator set.

#### SPECIFICATIONS

<b>Capacity</b>	
Maximum drill diameter in mild steel, mm	40
Range of spindle feeds (stepless variable), mm per revolution	0.03—0.16
Minimum feed of table and saddle, mm/min.	36
Distance, center of spindle to column, mm	700
Speed of rapid movement of table and saddle, mm/min.	1000
Distance, end of spindle to table, mm:	
minimum	250
maximum	750
Accuracy on center distances between holes to be bored, mm	0.008
<b>Spindle and Spindle Head</b>	
Taper in spindle, special	
Maximum vertical travel of spindle (by power and manually), mm	250
Maximum vertical travel of spindle head, mm	250
<b>Table and Saddle</b>	
Working surface of table, mm .....	1100×630
Maximum longitudinal travel of table, mm .....	1000
Maximum cross travel of saddle, mm	600
Accuracy of table and saddle locations, mm:	
dial reading .....	0.01
vernier reading .....	0.001
<b>Speeds and Feeds</b>	
Range of spindle speeds (stepless	

#### Space Occupied

Floor space, mm .....	2300×2840
Height of machine, mm .....	2550

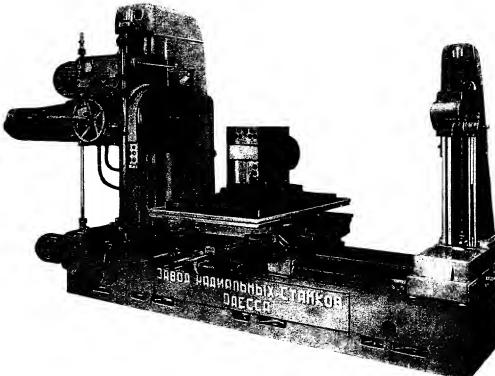
#### Weight

Net weight, kg .....	approx. 5560
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## HORIZONTAL BORING, DRILLING AND MILLING MACHINE

MODEL 2613



The 2613 Table Type Horizontal Boring, Drilling and Milling Machine has been designed to meet the speed, rigidity and accuracy demanded of the present-day machine tool. The machine can be advantageously applied for drilling, boring, core drilling and reaming holes on work pieces with close tolerances on center distances between holes. Milling and tapping (without changing pick-off gears) operations can be performed in this machine as well.

The machine is of the universal type and has a face plate with a slide moving radially on it. The spindle and face plate have different speeds and are driven by a motor through a speed gear box. Axial feeds of spindle,

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radial feeds of face plate slide, vertical feeds of headstock and cross and longitudinal feeds of table are effected through a feed box.

Rapid traverse of all movable parts is accomplished by a separate motor. Interlocking devices prevent any engagement which may lead to breakages.

When jig boring accurate locating of table and headstock is obtained by means of scales, stops, dial indicators and gauge blocks.

The rotary table can be freely rotated either by power or manually through any angle. A secure clamping is provided at each 90°.

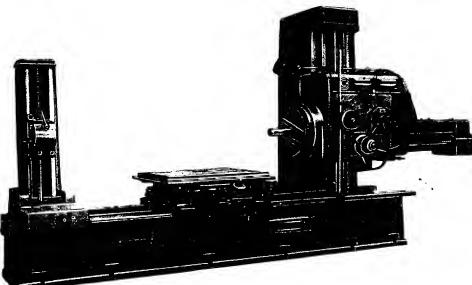
#### SPECIFICATIONS

<b>Capacity</b>	
Diameter of spindle, mm .....	62
Taper in spindle .....	Morse No. 4
Maximum axial travel of spindle, mm .....	560
<b>Table</b>	
Working surface of table, mm .....	900×710
Maximum travel of table (by power and manually), mm:	
longitudinal .....	1000
cross .....	800
<b>Headstock</b>	
Face plate diameter .....	490
Maximum radial travel of face plate slide, mm .....	150
Distance, spindle axis to table, mm:	
minimum .....	0
maximum .....	710
<b>Spindle and Feeds</b>	
Number of spindle speeds (face plate disengaged) .....	12
Range of spindle speeds (face plate disengaged), r.p.m. ....	51—1285
Number of face plate speeds (spindle either engaged or not) .....	12
Range of face plate speeds (spindle either engaged or not), r.p.m. ....	6.4—161
Number of spindle, table, headstock and face plate slide feeds (only spindle is revolving) .....	22
Range of longitudinal and cross feeds of table, axial feeds of spindle, ver-	
tical feeds of headstock and radial feeds of face plate slide (only spindle is revolving), mm per revolution .....	0.0125—1.5
Number of spindle, table, headstock and face plate slide feeds (spindle and face plate are revolving) .....	29
Range of spindle, table, headstock and face plate slide feeds (spindle and face plate are revolving), mm per revolution .....	0.0125—12
Number of milling feeds .....	18
Range of milling feeds, mm/min. ....	9.3—50
Number of thread feeds cut .....	14
Pitch of thread cut, mm:	
minimum .....	0.5
maximum .....	12
Speed of all rapid movements, m/min. ....	1
<b>Drive</b>	
220/380 volt, 3 phase, 50 cycle A.C. motor:	
Main drive:	
power, kW .....	4.5
range, r.p.m. ....	3000
Rapid traverse:	
power, kW .....	1.7
speed, r.p.m. ....	1000
<b>Space Occupied</b>	
Floor space, mm .....	4090×1970
Height of machine, mm .....	2300
<b>Weight</b>	
Net weight, kg .....	approx. 5900



#### HORIZONTAL BORING, DRILLING AND MILLING MACHINE

MODEL 262T



The 262T Table Type Horizontal Boring, Drilling and Milling Machine has been designed to meet the speed, rigidity and accuracy demanded of the present-day machine tool. The machine can be advantageously applied for drilling, boring, core drilling and reaming holes on large cumbersome work pieces with close tolerances on center distances between holes. Milling with shell or face milling cutters, facing and tapping operations can be performed in this machine as well.

The machine is of the universal type and has a face plate with a slide moving radially on it. The spindle and face plate have different speeds and are driven by a two-speed motor through a speed gear box. Axial feeds of spindle, radial feeds of face plate slide, vertical feeds of headstock and cross and longitudinal feeds of table are effected through a feed box. A wide range of speeds and feeds is provided. The machine has a single lever control of speeds and a single lever control of feeds. Any speed and feed may be selected and obtained without stopping the machine.

Rapid traverse of all movable parts is accomplished by a separate motor. Single lever control of all rapid traverse motions is provided. Interlocking devices prevent any engagement which may lead to breakages.

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СТАНКОИМПОРТ

A special design of clamping devices and ways eliminates backlashes and provides secure and accurate clamping of table and headstock when jig boring. Accurate locating of table and headstock is obtained by means of scales, stops, dial indicators and gauge blocks.

The built-in rotary table is mounted on balls and can be freely rotated by hand through any angle. A secure clamping is provided at each 90°.

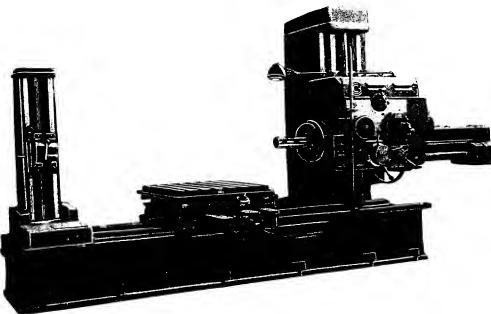
#### SPECIFICATIONS

Capacity		Range of spindle feeds, mm per revolution of spindle	mm per revolution of spindle
Diameter of spindle, mm	85	Range of table and headstock feeds, mm per revolution of spindle	0.025—8
Taper in spindle	Morse No. 5	Range of table and headstock feeds, mm per revolution of spindle	0.025—8
Maximum axial travel of spindle, mm	600	Range of table and headstock feeds, mm per revolution of face plate	0.05—16
Maximum distance, end of spindle to bar support, mm	2220	Range of face plate slide feeds, mm per revolution of face plate	0.025—8
<b>Table</b>		Speed of rapid axial movement of spindle, mm/min.	4.8
Working surface of table, mm	1000×800	Speed of rapid longitudinal and cross movements of table and vertical movement of headstock, mm/min.	2.4
Maximum travel of table (by power and manually), mm:		Speed of rapid movement of face plate slide, mm/min.	1.2
longitudinal	1140		
cross	850		
<b>Headstock</b>			
Face plate diameter, mm	630		
Maximum radial travel of face plate slide, mm	170		
Distance, spindle axis to table, mm:			
minimum	45	Drive	
maximum	800	220/380 volt, 3phase, 50 cycle A.C. motors:	
<b>Spindle and Feeds</b>		Main drive (two-speed):	
Number of spindle speeds	18	power, kW	6.5/7.0
Range of spindle speeds, r.p.m.	20—1000	speed, r.p.m.	1500/3000
Number of face plate speeds	15	Rapid traverse:	
Range of face plate speeds, r.p.m.	10—200	power, kW	2.8
Number of longitudinal, cross and vertical feeds of table, axial feeds of spindle, vertical feeds of headstock and radial feeds of face plate slide	18	speed, r.p.m.	1500
		<b>Space Occupied</b>	
		Floor space, mm	5070×2250
		Height of machine, mm	2755
		<b>Weight</b>	
		Net weight, kg	approx. 11750



#### HORIZONTAL BORING, DRILLING AND MILLING MACHINE

MODEL 262Д



The 262Д Table Type Horizontal Boring, Drilling and Milling Machine has been designed to meet the speed, rigidity and accuracy demanded of the present-day machine tool. The machine can be advantageously applied for drilling, boring, core drilling and reaming holes on large cumbersome work pieces with close tolerances on center distances between holes.

Milling with shell or face milling cutters and tapping operations can be performed in this machine as well.

The machine is of rigid construction. When designing, special attention was paid to the complete elimination of any vibration that may occur in any part of the machine during cuts.

The spindle is driven by a two-speed motor through a speed gear box. Axial feeds of spindle, vertical feeds of headstock and cross and longitudinal feeds of table are effected through a feed box. A wide range of speeds and feeds is provided.

The machine has a single lever control of speeds and a single lever control of feeds. Any speed and feed may be selected and obtained without stopping the machine.

СТАНКОИМПОРТ

СТАНКОИМПОРТ

Rapid traverse of all movable parts is accomplished by a separate motor. Single lever control of all rapid traverse motions is provided. Interlocking devices prevent any engagement which may lead to breakages.

When jig boring accurate locating of table and headstock is obtained by means of scales, stops, dial indicators and gauge blocks.

The built-in rotary table is mounted on balls and can be freely rotated by hand through any angle. A secure clamping is provided at each 90°.

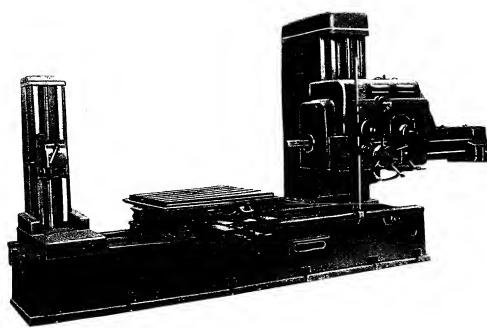
#### SPECIFICATIONS

Capacity		Range of spindle feeds, mm per revolution of spindle .....	0.05—16
Diameter of spindle, mm .....	110	Range of table and headstock feeds, mm per revolution of spindle .....	0.025—8
Taper in spindle .....	Morse No. 6	Speed of rapid axial movement of spindle, m/min .....	4.8
Maximum axial travel of spindle, mm .....	600	Speed of rapid longitudinal and cross movements of table and vertical movement of headstock, m/min .....	2.4
Maximum distance, end of spindle to bar support, mm .....	2360		
Table			
Working surface of table, mm .....	1000×800	Range of spindle speeds, r.p.m.: 220/380 volt, 3 phase, 50 cycles A.C. motors:	
Maximum travel of table (by power and manually), mm: longitudinal .....	1225	Motor drive two-speed:	
cross .....	850	power, kW .....	6.5/7.0
		speed, r.p.m. ....	1500/3000
Headstock			
Distance, spindle axis to table, mm: minimum .....	45	Rapid traverse: power, kW .....	2.8
maximum .....	800	speed, r.p.m. ....	1500
Spindle and Feeds		Space Occupied	
Number of spindle speeds .....	18	Floor space, mm .....	5070×2250
Range of spindle speeds, r.p.m. ....	20—1000	Height of machine, mm .....	2755
Number of longitudinal and cross feeds of table, axial feeds of spindle and vertical feeds of headstock .....	18	Weight	
		Net weight, kg .....	approx. 11350



## HIGH SPEED HORIZONTAL BORING, DRILLING AND MILLING MACHINE

MODEL 2621



The 2621 Table Type High Speed Horizontal Boring, Drilling and Milling Machine has been designed to meet the speed, rigidity and accuracy demanded of the present-day machine tool. The machine can be advantageously applied for high speed drilling, boring, core drilling and reaming holes on large cumbersome work pieces with close tolerances on center distances between holes.

High speed milling with shell or face milling cutters and tapping operations can be performed in this machine as well.

The machine is of rigid construction. When designing, special attention was paid to the complete elimination of any vibration that may occur in any part of the machine during cuts.

The spindle is driven by a two-speed motor through a speed gear box. The maximum spindle speed is 2000 r.p.m. Axial feeds of spindle, vertical feeds of headstock and cross and longitudinal feeds of table are effected through a feed box. A wide range of speeds and feeds is provided.

The machine has a single lever control of speeds and a single lever control of feeds. Any speed and feed may be selected and obtained without stopping the machine.

СТАНКОИМПОРТ

СТАНКОИМПОРТ

Rapid traverse of all movable parts is accomplished by a separate motor. Single lever control of all rapid traverse motions is provided. Interlocking devices prevent any engagement which may lead to breakages. A special design of clamping devices and ways eliminates backlashes and provides secure and accurate clamping of table and headstock when jig boring. Accurate locating of table and headstock is obtained by means of scales, stops, dial indicators and gauge blocks.

The built-in rotary table is mounted on balls and can be freely rotated through any angle. A secure clamping is provided at each 90°.

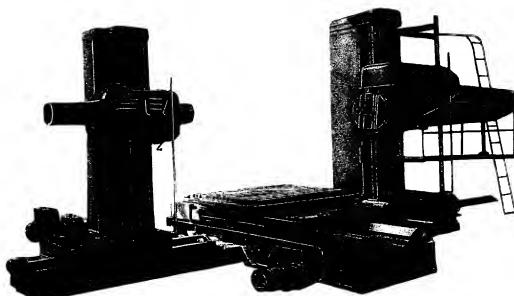
#### SPECIFICATIONS

Capacity		Range of spindle feeds, mm per revolution of spindle .....	0.026-8
Diameter of spindle, mm .....	85	Range of table and headstock feeds, mm per revolution of spindle .....	0.013-4
Taper in spindle .....	Morse No. 5	Speed of rapid axial movement of spindle, m/min. ....	4.8
Maximum axial travel of spindle, mm .....	600	Speed of rapid longitudinal and cross movements of table and vertical movement of headstock, m/min. ....	2.4
Table		Drive	
Working surface of table, mm .....	1000×800	220/380 volt, 3 phase, 50 cycle A.C. motors:	
Maximum travel of table (by power and manually), mm:		Main drive (two-speed):	
longitudinal .....	1200	power, kW .....	6.5/7.0
cross .....	850	speed, r.p.m. ....	1500/3000
Headstock		power, kW .....	2.8
Distance, spindle axis to table, mm:		speed, r.p.m. ....	1500
minimum .....	45	Rapid traverse:	
maximum .....	800	power, kW .....	2.8
Speeds and Feeds		Space Occupied	
Number of spindle speeds .....	18	Floor space, mm .....	5070×2250
Range of spindle speeds, rpm .....	38-2000	Height of machine, mm .....	2755
Number of longitudinal and cross feeds of table, axial feeds of spindle and vertical feeds of headstock ..		Weight	
18		Net weight, kg .....	approx. 11600



#### HORIZONTAL BORING, DRILLING AND MILLING MACHINE

MODEL 2654



The 2654 Horizontal Boring, Drilling and Milling Machine is of the universal type and is provided with a built-in rotary table and a face plate with a slide moving radially on it. The machine is designed primarily for machining large and heavy work pieces weighing up to 8 tons and can be advantageously applied for boring, facing, drilling, counterboring and reaming holes on parts with close tolerances on center distances between holes.

Face milling and tapping operations can be performed in this machine as well.

The machine incorporates a longitudinally moving column carrying on its vertical ways a headstock with boring spindle, a built-in face plate with radial slide, a built-in cross moving rotary table and a longitudinally moving bar support column with bearing block.

The table has no overhand over the ways in its extreme cross positions which considerably increases the accuracy of the machine when machining heavy work pieces.

The boring spindle and face plate are mounted on precision anti-friction bearings.

СТАНКОИМПОРТ

СТАНКОИМПОРТ

The nitrided spindle has high surface hardness. The spindle and the face plate are driven by an A.C. motor through a speed gear box. The design of the drive permits disengagement of the face plate rotation in the entire spindle speed range.

Speed changes are accomplished by a special mechanism arranged so as to prevent wear of slide gear teeth. Any speed may be selected without stopping the machine.

The feeds and set-up movements of column, headstock, spindle, face plate slide and table are effected by separate D.C. motors with a wide range of speed variation. The feed rate may be infinitely adjustable during the machine operation. Control of slow and rapid traverse set-up movements is obtained through a single lever and push-buttons.

An auxiliary hand wheel provides for fine axial adjustment of spindle.

The built-in rotary table has a cross movement along its runway. Rapid table indexing is effected by an A.C. motor. Accurate indexing of table by hand is also provided. A built-in mechanism fitted with an indicator permits accuracy of indexing to be observed at every 90°.

Accurate locating of headstock and table is obtained by measuring rods with adjustable stops and an automatic electro-positive stop device.

This arrangement may, in some cases, be used instead of jigs.

The machine is provided with centralized clamping control of movable units. The automatic clamping of headstock and table on their ways is interlocked with the engagement and disengagement of the movable units and does not require the operator's assistance.

In order to increase the accurate performance of the machine clamping the headstock on the column ways is effected in two perpendicular planes.

All the machine movements are controlled from a centralized control station on the headstock and a duplicate portable station.

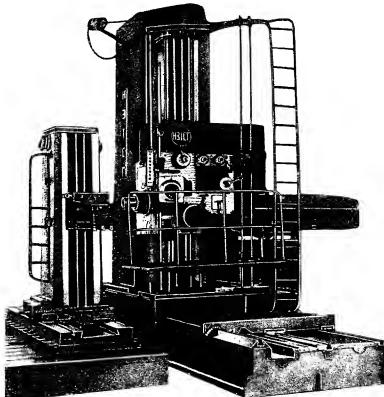
#### SPECIFICATIONS

Capacity		Speeds and Feeds	
Diameter of spindle, mm	150	Number of spindle speeds	22
Taper in spindle	Metric 80	Range of spindle speeds, r.p.m.	7.5—950
Maximum axial travel of spindle, mm	1200	Number of face plate speeds	18
		Range of face plate speeds, r.p.m.	3.75—192
			Range of feeds mm/min:
Face Plate			Spindle ..... 2—1500
Diameter of face plate, mm	900	Headstock, column and table	1—750
Maximum radial travel of face plate slide, mm	240	Face plate slide	0.5—375
Table			Range of set-up movement speeds, mm/min:
Working surface of table, mm:		Spindle	2.4—3200
length	1800	Headstock, column and table	1.2—1600
width	1500	Face plate slide	0.6—800
Maximum cross travel of table, mm	1600		
Headstock		Drive	
Distance, spindle axis to surface of table, mm:		220/380 volt, 3 phase, 50 cycle A.C. motor:	
minimum	60	Main drive:	
maximum	1800	power, kW	14
		speed, r.p.m.	1500
Headstock Column		Space Occupied	
Maximum longitudinal travel of column, mm	1650	Floor space, mm	10400×5600
			Height of machine, mm
			approx. 3850
Weight		Weight	
			Net weight, kg
			approx. 3850



#### HORIZONTAL BORING, DRILLING AND MILLING MACHINE

MODEL 265B



The 265B Floor Type Horizontal Boring, Drilling and Milling Machine has been designed to meet the accuracy, rigidity and speed demanded of the present-day machine tool. The machine can be advantageously applied for drilling, boring, core drilling and reaming holes on large and heavy work pieces with close tolerances on center distances between holes. Face milling operations can be performed in this machine as well.

The machine incorporates a cross movable column, carrying on its vertical ways a headstock with boring spindle and a stationary floor plate on which the work to be machined is fastened. A bar support column with bearing block is also mounted on the floor plate.

СТАНКОИМПОРТ

The machine has an extremely heavy 150 mm diameter spindle driven by a motor through a speed gear box.  
Axial feeds of spindle, vertical feeds of headstock and horizontal feeds of headstock column are effected through a feed box.  
Different pitches of threads cut are obtained by means of change gears.  
All the machine movements are controlled from a control station on the headstock and a pendant push-button station.

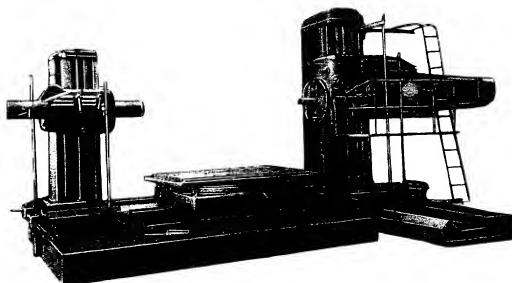
#### SPECIFICATIONS

Capacity		Range of spindle feeds, mm per revolution of spindle	Range of milling feeds of headstock and headstock column, mm/min.
Diameter of spindle, mm	150	0.05—8.4	
Taper in spindle	Metric 80		
Maximum diameter of hole bored, mm	1200		4.2—740
<b>Floor Plate</b>			
Working surface of floor plate, mm	4000×6420	220/380 volt, 3 phases, 50 cycle A.C. motors:	
Distance, spindle axis to floor plate, mm		Main drive: power, kW ..... 14 speed, r.p.m. ..... 1000	
minimum	630	Milling feed drive: power, kW ..... 3.2 speed, r.p.m. ..... 1500	
maximum	2630	Spindle rapid traverse: power, kW ..... 2.2 speed, r.p.m. ..... 3000	
<b>Headstock and Headstock Column</b>			
Axial travel of spindle, mm	1350	Headstock and headstock column traverse: power, kW ..... 4 speed, r.p.m. ..... 1500	
Maximum vertical travel of headstock, mm	2000	Bar support column traverse: power, kW ..... 1.8 speed, r.p.m. ..... 1000	
Maximum travel of headstock column, mm	4800		
<b>Bar Support Column</b>			
Maximum distance from end of spindle to bearing block of bar support column, mm	3000		
Maximum travel of bar support column, mm	2000		
<b>Speeds and Feeds</b>			
Number of spindle speeds	16	Space Occupied	
Range of spindle speeds, r.p.m.	3.35—600	Floor space, mm ..... 9835×8000	
Number of axial spindle feeds, vertical headstock feeds and horizontal headstock column feeds	16	Height of machine, mm ..... 3720	
		Weight	
		Net weight, kg ..... approx. 63000	



#### HORIZONTAL BORING, DRILLING AND MILLING MACHINE

MODEL 2657



The 2657 Floor Type Horizontal Boring, Drilling and Milling Machine is of the universal type and is provided with a stationary floor plate and a detachable rotary table. The Machine is designed primarily for machining large and heavy work pieces, regardless of their weight when placed upon the stationary floor plate, and of work pieces weighing up to 12 tons when being set on the detachable rotary table.

The machine can be advantageously applied for boring, facing, drilling, counterboring and reaming holes on parts with close tolerances on center distances between holes.

Face milling and tapping operations can be performed in this machine as well.

The machine incorporates a cross movable column, carrying on its vertical ways a headstock with boring spindle, and a built-in face plate with a slide moving radially on it, a stationary floor plate, a detachable and longitudinally movable rotary table and an adjustable bar support column with a bearing block.

The boring spindle and face plate are mounted on precision anti-friction bearings.

The nitrided boring spindle has high surface hardness. The spindle and the face plate are driven by an A.C. electric motor through a speed gear

СТАНКОИМПОРТ

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box. The design of the drive permits disengagement of the face plate rotation in the entire range of the boring spindle speeds.

Speed changes are accomplished by a special mechanism arranged so as to prevent wear of slide gear teeth. Any speed may be selected without stopping the machine.

The feeds and set-up movements of column, headstock, spindle, face plate slide and table are effected by separate D.C. motors with a wide range of speed variation. The feed rate may be infinitely adjustable during the machine operation.

Control of slow and rapid traverse set-up movements is obtained through a single lever and push-buttons.

An auxiliary hand wheel provides for fine axial adjustment of spindle. The detachable rotary table placed on the stationary floor plate can be traversed along its runway and indexed by a D.C. electric motor. An auxiliary easy indexing of table by hand is also provided. A built-in mechanism, fitted with an indicator, permits accuracy of indexing to be observed at every 90°. A circular scale provides for table index readings to any given angle.

Accurate locating of headstock and column is obtained by measuring rods with adjustable stops and an automatic electro-positive stop device.

This arrangement may, in some cases, be used instead of jigs.

An optical device ensures accurate alignment of spindle and bearing block of bar support column.

The machine is provided with centralized clamping control. The automatic clamping of headstock and column on their runways is interlocked with the engagement and disengagement of the movable units, and does not require the operator's assistance.

In order to increase the accurate performance of the machine clamping the headstock on the column ways is effected in two perpendicular planes.

All the machine movements are controlled from a centralized control station on the headstock and a duplicate portable station.

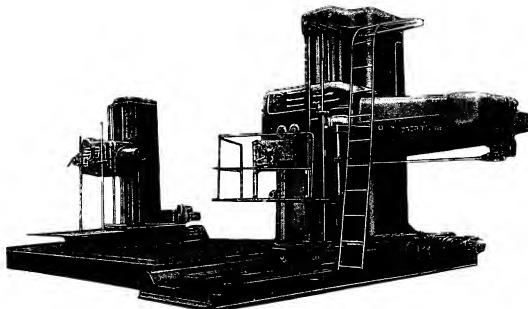
#### SPECIFICATIONS

<b>Capacity</b>	Range of spindle speeds, r.p.m. . . . .	7.5—950	
Diameter of spindle, mm . . . . .	150	Number of face plate speeds . . . . .	18
Taper in spindle . . . . .	Metric 80	Range of face plate speeds, r.p.m. . . . .	3.75—192
Maximum axial travel of spindle, mm . . . . .	1200	Range of feeds, mm/min: . . . . .	
<b>Face Plate</b>	Spindle . . . . .	2—1500	
Diameter of face plate, mm . . . . .	900	Headstock, column and table 1—750	
Maximum radial travel of face plate slide, mm . . . . .	240	Face plate slide . . . . .	0.5—800
<b>Detachable Table</b>	Range of set-up movement speeds, mm/min: . . . . .		
Working surface of table, mm:	Spindle . . . . .	2.4—3200	
length . . . . .	Headstock, column and table 1.2—1600		
width . . . . .	Face plate slide . . . . .	0.6—800	
Maximum travel of table, mm . . . . .			
<b>Headstock</b>			
Distance, spindle axis to floor plate, mm:	Spindle:	2.4—3200	
minimum . . . . .	power, kW . . . . .	14	
maximum . . . . .	speed, r.p.m. . . . .	1500	
<b>Headstock Column</b>	Main drive:		
Maximum cross travel of column, mm . . . . .	power, kW . . . . .		
Number of spindle speeds . . . . .	speed, r.p.m. . . . .		
Number of spindle speeds . . . . .	Net weight, kg . . . . .	approx. 51500	



## HORIZONTAL BORING, DRILLING AND MILLING MACHINE

MODEL 2656



The 2656 Floor Type Horizontal Boring, Drilling and Milling Machine is designed primarily for machining large and heavy work pieces regardless of their weight.

The machine can be advantageously applied for boring, drilling, counterboring and reaming holes on work pieces with close tolerances on center distances between holes. Face milling and tapping operations can be performed in this machine as well.

The machine incorporates a cross movable column, carrying on its vertical ways a headstock with boring spindle, a stationary floor plate and a portable bar support column with a bearing block.

The machine has an extremely heavy 175 mm diameter nitrided boring spindle mounted on precision anti-friction bearings. The spindle is driven by an A.C. electric motor through a speed gear box.

Change of speeds is accomplished by means of a special mechanism, arranged so as to prevent wear of slide gear teeth. Any speed may be selected and obtained without stopping the machine.

СТАНКОИМПОРТ

СТАНКОИМПОРТ

The feeds and set-up movements of column, headstock and spindle are obtained through separate D.C. motors with a wide range of speed variation.

The feed rate may be infinitely adjustable during the machine operation.

Control of slow and rapid traverse set-up movements of column, headstock and spindle is effected by a single lever and push-buttons. An auxiliary hand wheel provides for fine axial adjustment of spindle.

Accurate locating of headstock and column is obtained by end measuring rods with adjustable stops and an automatic electro-positive stop device.

This device may, in some cases, be substituted for jigs. An optical reading device ensures accurate alignment of spindle and bearing block of bar support column.

The machine is provided with centralized clamping control. The automatic clamping of headstock and column on their runways is interlocked with the engagement and disengagement of the moving units and does not require the operator's assistance.

Clamping the headstock on the column ways is effected in two perpendicular planes thus improving the accuracy of the machine.

All the machine movements are controlled from a centralized control station and a duplicate portable station.

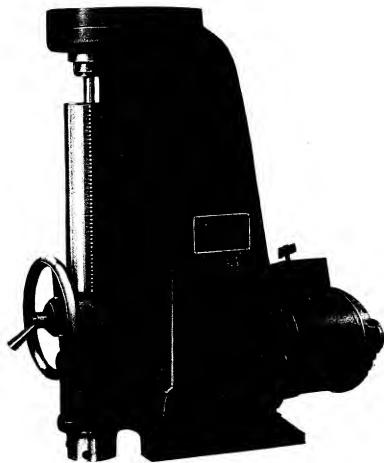
#### SPECIFICATIONS

<b>Capacity</b>		Range of set-up movement speeds, mm/min:
Diameter of spindle, mm .....	175	Spindle ..... 2.4—3200
Taper in spindle .....	Metric 100	Headstock and column .. 1.2—1600
Maximum axial travel of spindle, mm .....	1200	
<b>Headstock</b>		<b>Drive</b>
Distance, spindle axis to floor plate, mm:		220/380 volt, 3 phase, 50 cycle A.C. motor:
minimum .....	600	Main drive: power, kW ..... 14
maximum .....	2400	speed, r.p.m. ..... 1500
<b>Headstock Column</b>		<b>Space Occupied</b>
Maximum travel of column, mm .....	3200	Floor space, mm ..... 10900×7200
<b>Speeds and Feeds</b>		Height of machine, mm ..... 4900
Number of spindle speeds .....	22	<b>Weight</b>
Range of spindle speeds, r.p.m. ....	7.5—950	Net weight (including floor plate), kg ..... approx. 41500
Range of feeds, mm/min:		
Spindle .....	2—1500	
Headstock and column .....	1—750	



#### PORABLE BORING MACHINE FOR CYLINDER BLOCKS

MODEL 2685



This machine is designed for boring cylinder blocks in repair shops.  
When machining cylinder blocks, the machine is installed and bolted  
on the cylinder block.

The machine is driven from an individual electric motor.

СТАНКОИМПОРТ

СТАНКОИМПОРТ

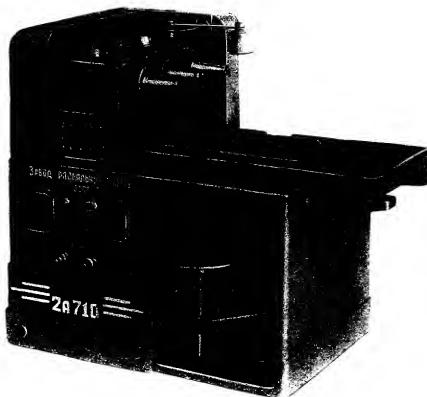
SPECIFICATIONS

Capacity	Drive
Diameter that can be bored, mm:	220/380 volt, 3 phase, 50 cycle A.C. motor:
minimum .....	power, kW .....
maximum .....	speed, r.p.m. ....
Maximum length that can be bored, mm .....	0.65 .....
mm .....	3000 .....
Speeds and Feeds	Space Occupied
Spindle speed, r.p.m. ....	Floor space, mm .....
Feed per revolution of spindle, mm .....	Height of machine, mm .....
Spindle speed, r.p.m. ....	660×260 .....
Feed per revolution of spindle, mm .....	705 .....
Weight	
Net weight, kg .....	approx. 100 .....



SINGLE END HORIZONTAL  
PRECISION BORING MACHINE

MODEL 2A710



The 2A710 Precision Boring Machine is designed for extremely accurate finish boring to size and alignment of bores with high grade surface finish. Depending on set-up one or several holes can be bored in one or two passes.

The operation cycle of the machine is semi-automatic.

The machine is supplied with fixtures by means of which clamping the work pieces, traverse, positioning, swiveling and other auxiliary operations are performed automatically.

When the machine is set up for wet boring a coolant system is supplied.

СТАНКОИМПОРТ

СТАНКОИМПОРТ

The number of spindle heads (of which there are five different types and sizes) depends upon the set-up.  
The machine is equipped with two motors.

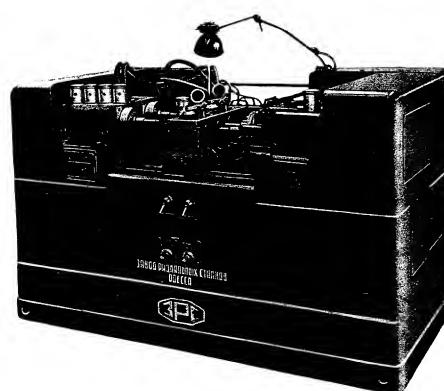
## SPECIFICATIONS

Capacity	Speeds and Feeds
Diameter of hole that can be bored, mm:	
maximum ..... 200	Number of spindle speeds ..... 1
minimum ..... 8	Maximum spindle speed, r.p.m. ..... 5000
Spindle Heads	Minimum feed of table (continuously variable), mm/min. ....
Maximum number of heads set up on each bridge (depending upon their type and size) ..... 2—4	380 volt, 3 phase, 50 cycle main drive A.C. motor power (depending on set-up), kW ..... 1—2.6
Table	Hydraulic pump motor:
Working surface of table, mm ... 400×600	power, kW ..... 1 speed, r.p.m. ..... 1000
Table travel, mm ..... 275	Space Occupied
Distance from base of machine to working surface of table, mm ..... 890	Floor space, mm ..... 1500×1000
Distance from spindle axis to table surface (depending upon type and size of head), mm ..... 230—270	Height of machine, mm ..... 1350
	Weight
	Net weight (without set-up), kg approx. 1900



## DOUBLE END HORIZONTAL PRECISION BORING MACHINE

MODEL 2A715



The 2A715 Precision Boring Machine is designed for extremely accurate finish boring to size and alignment of opposed bores with high grade surface finish.

Depending on set-up one or several holes can be bored in one or two passes.

The operation cycle of the machine is semi-automatic.

The machine is supplied with fixtures by means of which clamping the work pieces, traverse, positioning, swiveling and other auxiliary operations are performed automatically.

When the machine is set up for wet boring a coolant system is supplied.

The number of spindle heads (of which there are five different types and sizes) depends upon the set-up.

The machine is equipped with three motors.

СТАНКОИМПОРТ

СТАНКОИМПОРТ

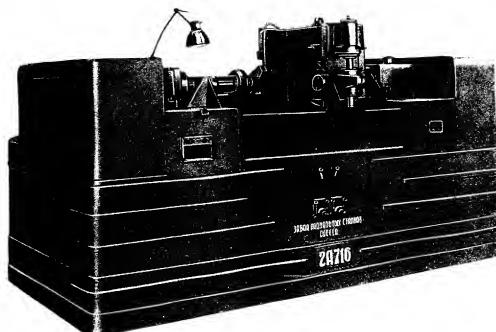
**SPECIFICATIONS**

<b>Capacity</b>	<b>Spindle Heads</b>	<b>Speeds and Feeds</b>
Diameter of hole that can be bored, mm:		
maximum ..... 200		Number of spindle speeds ..... 1
minimum ..... 8		Maximum spindle speed, r.p.m. ..... 5000
		Minimum feed of table (infinitely variable), mm/min. ..... 10
<b>Spindle Heads</b>		
Maximum number of heads set up on each bridge (depending upon their type and size) ..... 2—4		
<b>Table</b>	<b>Drive</b>	
Working surface of table, mm ... 400×600	380 volt, 3 phase, 50 cycle main drive	
Table travel, mm ..... 450	Motor power (depending on set-up), kW ..... 1.7—4.5	
Distance from base of machine to working surface of table, mm ..... 890	Hydraulic pump motor:	
Distance from spindle axis to table surface (depending upon type and size of head), mm ..... 230—270	power, kW ..... 1 speed, r.p.m. ..... 1000	
	<b>Space Occupied</b>	
	Floor space, mm ..... 2015×1200	
	Height of machine, mm ..... 1400	
	<b>Weight</b>	
	Net weight (without set-up), kg approx. 3000	



## **DOUBLE END HORIZONTAL PRECISION BORING MACHINE**

MODEL 2A716



The 2A716 Precision Boring Machine is designed for extremely accurate finish boring to size and alignment of opposed bores with high grade surface finish.

The machine can be set up for boring either one or several holes in one or two passes.

The cycle of operations is semi-automatic. The machine is supplied with fixtures by means of which the clamping of work pieces, traverse, positioning, swiveling and other auxiliary operations are performed automatically.

When the machine is set up for work requiring cooling, a coolant pump is supplied.

The number of spindle heads (of which there are five different types and sizes) depends upon the set-up.

The machine is equipped with three electric motors.

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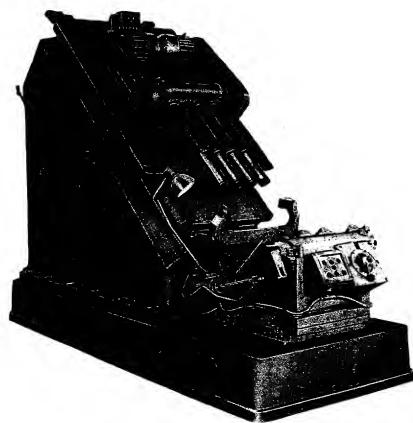
**SPECIFICATIONS**

<b>Capacity</b>	<b>Spindle Heads</b>	<b>Speeds and Feeds</b>
Diameter of hole that can be bored, mm:		
minimum ..... 8		Number of spindle speeds ..... 1
maximum ..... 200		Maximum speed of spindle, r.p.m. ... 5000
		Minimum working feed of table (infinitely variable), mm/min. .... 10
<b>Spindle Heads</b>		
Maximum number of heads set-up on each bridge (depending upon their type and size) .....	3—6	Drive motor power (depending upon set-up), kW ..... 1—4.5
		Electric motor of hydraulic pump:
		power, kW ..... 1
		speed, r.p.m. .... 1000
<b>Table</b>		
Working surface of table, mm ... 600×800		Space Occupied
Table travel, mm ..... 700		Floor space, mm ..... 2900×1375
Distance from base of machine to working surface of table, mm ... 925		Height of machine, mm ..... 1460
Distance from axis of spindle to table (depending upon type and size of head), mm ..... 260—300		Weight
		Net weight (without set-up), kg approx. 5400



## **INCLINED MULTIPLE SPINDLE PRECISION BORING MACHINE**

MODEL 2791



The 2791 Precision Boring Machine is designed and built to include the extreme accuracy required for finish boring by means of single-point tungsten carbide tools, which is known to industry as diamond boring or fine boring. The machine, when equipped with suitable fixtures, is especially applied for finish boring cylinder blocks of automatic engines.

The inclined arrangement of the spindles assures a high accuracy of the machine owing to the close fit of the spindle slides to the machine ways. A better chip removal is secured by this arrangement as well.

— СТАНКОИМПОРТ —

— СТАНКОИМПОРТ —

The drive to the spindles is a smooth running spiral drive which permits spindle heads to be set at different spacings with a minimum of shut-down time for the machine. The spiral drive receives its power from two motors through V-belts.

The spindle feed is obtained by hydraulic means thus securing an infinite number of feeds.

The machine is equipped with a hydraulic fixture allowing work loading directly from the roll table, work inclination, then work locking and clamping.

The working cycle of the machine is completely automatic. The automatic cycle includes: tool approach, feed, starting and stopping spindle rotation, turning the spindles into withdrawal position, receding work from tools, and tool withdrawal without scoring the bores.

Work holding fixture, speed reducer and spindle heads are furnished as separate items to fit the requirements of the work.

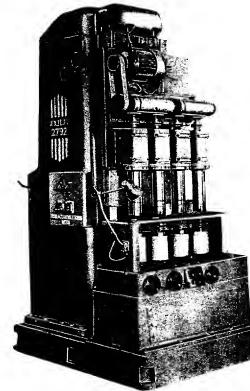
#### SPECIFICATIONS

Capacity	Drive
Maximum diameter of holes bored, mm .....	220/300 volt, 3 phase, 50 cycle A.C. motors:
..... 200	Spindle heads (2 motors):
Maximum travel of spindle slides, mm .....	power, kW ..... 1.7 ..... 450 speed, r.p.m. .... 3000
Number of spindle heads .....	Hydraulic pump: power, kW ..... 1.7 ..... according to set-up speed, r.p.m. .... 1000
Number of tools in spindle head .....	Space Occupied
..... 1	Floor space, mm ..... 2980×1180 Height of machine, mm ..... 2500
<b>Speeds and Feeds</b>	
Spindle speed, r.p.m. ... according to set-up Range of spindle feeds (ininitely variable), mm/min. .... 0—300	Weight
.....	Net weight, kg ..... approx. 12000



## VERTICAL MULTIPLE SPINDLE PRECISION BORING MACHINE

MODEL 2792



The 2792 Precision Boring Machine is designed and built to include the extreme accuracy required for finish boring by means of single-point tungsten carbide tools, which is known to industry as diamond boring or fine boring. The machine, when equipped with suitable fixtures, is especially applied for finish boring cylinder sleeve liners, cylinder blocks and crank cases of automotive engines.

The drive to the spindles is a smooth running spiral drive which permits spindle heads to be set at different spacings with a minimum of shut-down time for the machine. The spiral drive receives its power from a motor through V-belts.

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The spindle feed is obtained by hydraulic means, thus securing an infinite number of feeds.

The working cycle of the machine is completely automatic. The automatic cycle includes: tool approach, feed, starting and stopping spindle rotation, and tool withdrawal without scoring the bores. Work holding fixture, speed reducer and spindle heads are furnished as separate items to fit the requirements of the work.

#### SPECIFICATIONS

Capacity	Spindle heads:
Diameter of holes bored, mm:	power, kW ..... 4.5
minimum ..... 80	speed, r.p.m. ..... 1500
maximum ..... 200	Hydraulic pump:
Maximum travel of spindle slides, mm	power, kW ..... 1.7
450	speed, r.p.m. ..... 1000
Maximum number of spindle heads ..	4
Number of tools in spindle head ..	1
Speeds and Feeds	Space Occupied
Spindle speed, r.p.m., according to set-up	Floor space, mm ..... 1950×1250
Range of spindle feeds (ininitely variable), mm/min. .... 0-300	Height of machine, mm ..... 3550
Drive	Weight
220/380 volt, 3 phase, 50 cycle A.C. motors:	Net weight, kg ..... approx. 12000

#### VSESOUZNOJE EXPORTNO-IMPORTNOJE OBJEDINENIJE

#### "STANKOIMPORT"

#### EXPORTS AND IMPORTS:

Machine Tools  
Woodworking Machinery  
Metal Working Machinery (Presses, Hammers, Shears, Cold Forming Machines, Punching Machines)  
Rolling Mills (imports)  
Measuring Instruments and Apparatus (for metal industry)  
Testing Machines and Instruments (for metals)  
Optical Instruments and Equipment  
Portable Electric and Pneumatic Tools (for metal and wood-working)  
Metal and Wood Cutting Tools  
Mechanic's Tools and Chucks  
Sintered Carbide and Hard-Alloy Products  
Abrasive Products  
Ball and Roller Bearings  
Microscopes of all types  
Motion-Picture Equipment and Accessories  
Geodetic Instruments and Equipment  
Photographic Cameras  
Binoculars  
Magnifiers  
Lenses  
Crude Optical Glass Blocks and Blanks

Design and specifications of the machine tools illustrated herein are subject to change without notice.

Vneshorgizdat. Order No. 155

— СТАНКОИМПОРТ —



# CROSS-COUNTRY CAR

## ГАЗ-69

### OPERATION MANUAL

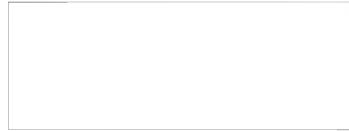


VSESOYUZNOYE OBJEDINENIE  
“TECHNOPROMIMPORT”  
MOSCOW

# CROSS-COUNTRY CAR

## ГАЗ-69

OPERATION MANUAL



STAT



VSESOJUZNOJE OBJEDINENIJE  
“TECHNOPROMIMPORT”  
Moscow

#### CAUTION

While operating the ГАЗ-69 Automobile observe the following rules:

1. Follow the maintenance recommendations outlined in this Manual.

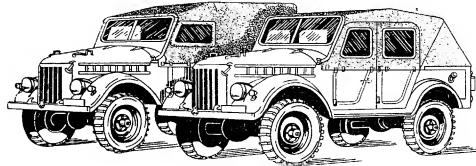


Fig. 1.

2. Use gasoline of not less than 66 octane number and oils of such grades as recommended in the Lubrication Instructions.
3. Regularly change the fine oil filter element.
4. Change engine crankcase oil at regular intervals. Do not work the engine with insufficient oil in the crankcase.
5. Drain the cooling system through two cocks, simultaneously opening the radiator cap and heater cock.
6. Maintain the temperature of cooling water within the range of 8° to 90° C. In winter use a warm cover on the engine hood. Do not work the engine with insufficient water in the radiator.
7. Check frequently the opening of the carburetor main jet needle. The needle should be turned off 1½ or 2 turns.
8. The limiter throttle washer installed at the Manufacturer's Works between the carburetor and inlet manifold should be removed only after completion of running-in. In the lower rear part of the inlet pipe there is a plug for draining excess gasoline accumulating due to over-choking.
9. Enrichment of mixture by means of the choke button should be used with discretion, when starting a cold engine only.

10. Never race the engine and do not start the automobile with the engine insufficiently warmed up.

11. Fill the hydraulic brake system with a special brake fluid only. Never use the hand brake while the automobile is in motion. The hand brake is intended for parking only.

12. Engage the front driving axle for driving over difficult roads only.

13. Adjust in due time all assemblies and mechanisms of the automobile. Do not use the automobile with an excessive play in the clutch pedal and brake pedal and backlash in the steering gear.

14. Before putting a new automobile into service it should be run-in in conformity with instructions contained in this Manual.

#### SPECIFICATIONS

##### GENERAL DATA

Model . . . . .	ГАЗ-69, ГАЗ-69А
Type . . . . .	cross-country automobile with two driving axles
Load-carrying capacity:	
ГАЗ-69 . . . . .	8 passengers or 2 passengers and 500 kg of load
ГАЗ-69А . . . . .	5 passengers and 50 kg of load
Maximum weight of loaded trailer, kg	800
Overall dimensions, mm:	
length . . . . .	3,850
width . . . . .	
ГАЗ-69 . . . . .	1,850
ГАЗ-69А . . . . .	1,750
height . . . . .	
ГАЗ-69 . . . . .	2,030
ГАЗ-69А . . . . .	1,920
Wheelbase, mm	2,300
Tread (front and rear wheels), mm	1,440
Ground clearance, mm	210
Turning radius, m	6
Weight of automobile, kg:	
ГАЗ-69 . . . . .	1,525
ГАЗ-69А . . . . .	1,535
Maximum road speed, km/hr	90
Climbing ability on solid soil:	
without trailer . . . . .	30°
with 800 kg trailer . . . . .	20°
Gasoline grade . . . . .	66 octane number

##### ENGINE

Type . . . . .	four-stroke cycle gasoline engine
Number of cylinders . . . . .	4
Bore, mm . . . . .	82
Stroke, mm . . . . .	100

Displacement, litres . . . . .	2.12
Compression ratio . . . . .	6.5
Horsepower at 3600 r.p.m. . . . .	55
Maximum torque, kg.m . . . . .	12.7
Firing order . . . . .	1-2-4-3
Engine mounting . . . . .	floating, on three points of aluminium alloy
Cylinder head . . . . .	of cast iron with short liners of anti-corrosion cast iron
Cylinders . . . . .	of aluminium with two compression rings and two oil control rings
Pistons . . . . .	of steel with counter-weights, on four bearings
Crankshaft . . . . .	symmetrical
Connecting rods . . . . .	thin-walled, bimetallic type
Bearing shells . . . . .	of steel. Forced lubrication
Camshaft . . . . .	of journals. Driven by a pair of gears
Valves . . . . .	Valve head diameter, mm: Inlet — 39 Exhaust — 36
Valve lifters . . . . .	disc type with adjusting bolts
Valve data	
(0.35 mm clearance) . . . . .	Inlet Valve: opens — 9° before TDC closes — 51° past BDC Exhaust Valve: opens — 47° before BDC closes — 13° past TDC
Inlet manifold . . . . .	on R. H. side of engine. In the center there is a mixture heating chamber with automatically controlled throttle valves
Lubricating system . . . . .	combination forced and splash type
Oil suction belt . . . . .	floating type
Oil filters . . . . .	two: coarse oil filter of plate type and fine oil filter with replaceable filter element
Oil cooler . . . . .	tubular type. Operated by a cock located near oil pump
Crankcase ventilation . . . . .	forced type
Lubricating system valves . . . . .	relief valve located in oil pump cover. Bypass valve in coarse oil filter body
Gasoline sediment bowl . . . . .	mounted on L.H. side of frame. Diaphragm type with inverted sediment bowl. Equipped with a manual fuel lift device
Fuel pump . . . . .	K-22Д type with adjusting needle
Carburetor . . . . .	screen type with oil cup
Air cleaner . . . . .	forced water circulation
Cooling . . . . .	gilled-tubes in three rows
Radiator . . . . .	air-tight, equipped with two valves
Radiator filler cap . . . . .	installed in front of radiator. Controlled from driver's seat
Radiator blind . . . . .	opens at 7°—89° C
Thermostat . . . . .	centrifugal type with self-adjusting seal
Water pump . . . . .	six-blade type, belt-driven from crankshaft
Fan . . . . .	mounted on engine L.H. side under the hood.
Starting heater . . . . .	Consists of boiler and heater torch

**POWER TRANSMISSION**

Clutch . . . . .	dry, single-plate type
Transmission . . . . .	two-range gear box with three speeds forward and one reverse
Overall ratios:	
1 st gear . . . . .	3.115
2 nd gear . . . . .	1.772
3 rd gear . . . . .	1.00
Reverse . . . . .	3.738
Transfer Case . . . . .	two-speed with gear ratios 1.15 and 2.78. Two levers for shifting into high and low speeds and also for engaging and disengaging the front axle. Low speed gear ratio 2.78 can be engaged with engaged front axle only.
Propeller shafts . . . . .	three shafts: intermediate, rear and front; universal joints on needle bearings
Bevel gear in front and rear axles . . . . .	spiral bevel gear. Ratio 5.125
Differential . . . . .	bevel gear with two satellites
Axle shafts . . . . .	full floating type
Transmission of pushing and torque reaction . . . . .	by springs

**RUNNING GEAR**

Number of wheels . . . . .	two front wheels, two rear wheels, one spare wheel
Tyres . . . . .	low pressure, 6.50 X 16". Tread with non-skid pattern
Front wheel angles . . . . .	camber 1°30'; king pin inclination 5°; caster 3°; toe-in 1.5 to 3 mm
Suspension . . . . .	four longitudinal semi-elliptical springs, four hydraulic piston type two-way shock absorbers

**STEERING GEAR**

Type . . . . .	globoid worm with twin roller
Steering wheel . . . . .	three-arm type
Steering rods . . . . .	tubular type with ball pins
Foot brakes . . . . .	four-wheel, shoe type; hydraulic drive from foot pedal

Hand brake . . . . . shoe type, mechanically operated. Located on transfer case

**ELECTRIC EQUIPMENT**

Voltage, V . . . . .	12
Generator . . . . .	PP20 type, 12 V, 18 A, shunt-wound machine with current and voltage regulator and circuit breaker of PP20 type
Storage battery . . . . .	6CT-54 type, 12V, 54 Ah
Ignition coil . . . . .	BI type, with additional resistor cut-in during engine starting
Distributor . . . . .	P20 type with centrifugal and vacuum spark advance control and octane selector
Spark plugs . . . . .	M12Y type; 18X1.5 mm thread
Starting motor . . . . .	CT20 type with forced engagement

**LIGHTING EQUIPMENT**

Light switches . . . . .	two head lamps with traffic and country light. Two side lamps, one spotlight, tail light with «Stop» and license lamps, inspection lamp, hood lamp, instrument panel light, two instrument lights
Sockets . . . . .	two for inspection lamp and trailer lamp
Horn . . . . .	C56-B type, electric, vibration type
Fuse . . . . .	heavy fuse, button type in lighting circuit, ordinary fuse in horn, tail light and instrument light circuits
Electric wiring . . . . .	single wire type (positive pole grounded to the frame)
Instruments and tell-tale lamps . . . . .	instrument cluster (speedometer with odometer, gasoline level gauge, oil pressure gauge, ammeter and water thermometer). Green tell-tale lamp showing excessively high temperature in radiator; country light red indicator lamp.

**BODY AND BODY EQUIPMENT**

Body:	
ГАЗ-69 . . . . .	all-metal, two-door type with folding tail-board and removable canopy
ГАЗ-69А . . . . .	all-metal, four-door type with luggage compartment and removable canopy
Body equipment . . . . .	canopy, electric screen wiper with two wiper blades, rear view mirror, two sun visors, two mats, hand strap, body heater and screen defroster
Windscreen . . . . .	adjustable in special frame
Front seats . . . . .	two cushioned, removable, with cushioned backrests
Rear seats:	
ГАЗ-69 . . . . .	two folding semi-cushioned seats located along body side boards
ГАЗ-69А . . . . .	one cushioned seat with cushioned backrest ventilation port in front of windscreens controlled from driver's seat. Air is heated by body heater
Body heating and ventilation . . . . .	Windscreen defrosting . . . . . by warm air from electric ventilator

**CAPACITIES, LITRES**

ГАЗ-69 Fuel tanks:	
main . . . . .	48
auxiliary . . . . .	27
ГАЗ-69A Fuel tank . . . . .	60
Cooling system . . . . .	12
Lubricating system (incl. filters) . . . . .	5.5
Air cleaner . . . . .	0.25
Transmission housing . . . . .	1.8
Transfer case housing . . . . .	1.1
Front and rear axle casings (each) . . . . .	0.75
Steering gear case . . . . .	0.33
Shock absorbers (each) . . . . .	0.145
Hydraulic brakes . . . . .	0.4
Spare oil can . . . . .	6

**SERVICE ADJUSTMENT DATA**

Valve to valve lifter clearance, mm:	Engine warm	Engine cold
inlet valves . . . . .	0.20	0.23
exhaust valves . . . . .	0.25	0.28
Clutch pedal play, mm . . . . .	38 to 45	
Brake pedal play, mm . . . . .	8 to 14	
Normal fan belt sag, mm . . . . .	10 to 15	
Breaker point gap, mm . . . . .	0.35 to 0.45	
Spark plug gap, mm . . . . .	0.7 to 0.8	
Normal temperature of cooling water	80 to 90°C	
Tyre pressure, kg/sq. cm:		
front wheels . . . . .	2	
rear wheels . . . . .	2.2	
Lubricating oil pressure, kg/sq. cm:		
at 45 km/hr . . . . .	2 to 4	
at idle speed, minimum . . . . .	0.5	

**CONTROLS AND INSTRUMENTS**

Arrangement of controls and instruments is shown in Figs. 2 and 3.

Two windscreen wipers and wiper switch are installed in the upper part of the windscreen.

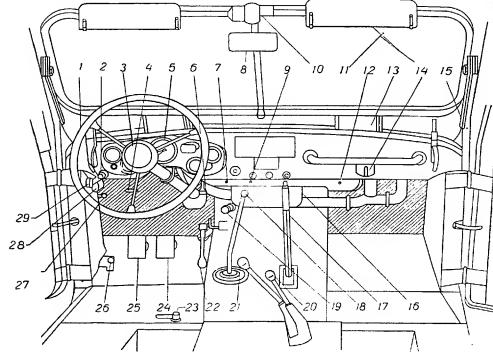


Fig. 2. Instruments and Controls

1 — steering wheel, 2 — windscreen frame latch, 3 — horn button, 4 — radiator blind handle, 5 — instrument cluster, 6 — ventilation port lever; 7 — lighting fuse button, 8 — mirror, 9 — instrument illumination switch, 10 — windscreen wiper switch, 11 — wiper, 12 — body lighting lamp switch, 13 — defroster, 14 — body lighting lamp, 15 — windscreen adjusting arm, 16 — heater, 17 — brake lever, 18 — gear shift lever, 19 — starter pedal, 20 — transfer case lever, 21 — front axle control lever, 22 — accelerator pedal, 23 — three-way cock (TA3-49), 24 — brake pedal, 25 — clutch pedal, 26 — lighting foot switch, 27 — spotlight lamp switch, 28 — fuse block, 29 — socket.

Located on the instrument panel are: instrument cluster consisting of the speedometer, ammeter, gasoline level gauge (main tank), thermometer for cylinder head cooling water, engine oil pressure gauge;

instrument illumination lamps, country beam indicator red lamp and green tell-tale lamp showing engine overheating.

The lighting master switch button has three positions: pressed all the way in — lighting is switched off; pulled halfway out — side lamps and tail light are on; pulled all the way out — head lamps and tail

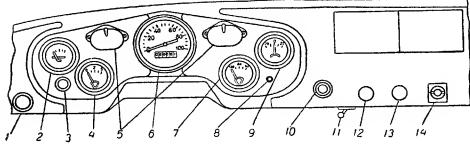


Fig. 3. Instrument Panel

1 — lighting master switch, 2 — gasoline level gauge, 3 — water temperature tell-tale lamp, 4 — oil pressure gauge, 5 — ammeter, 6 — speedometer, 7 — thermometer, 8 — entry lamp indicator, 9 — ammeter, 10 — ignition switch, 11 — instrument light switch, 12 — choke button, 13 — manual throttle control button, 14 — defroster switch.

light are on. Ignition switch is turned on by moving it clockwise. Choke knob pulling the knob out closes the choke. Manual throttle control to open throttle valve pull the button out. Defroster switch has three positions: middle — ventilator is switched on, — low speed of ventilator, right — high speed of ventilator. Cab lighting lamp.

Located on the lower edge of the instrument panel are: lighting fuse button; instrument panel lighting switch (operates with the master lighting switch turned ON only); cab lighting lamp switch.

Under the instrument panel there are: radiator blind control handle (to close — move back, to open — move forward); ventilation port door lever (to open — move back); inspection lamp socket; fuse block; spotlight switch.

Located on the floor are: lighting foot switch; clutch pedal; brake pedal; accelerator pedal; starter pedal; gear shift lever; front axle engagement lever; transfer case control lever; hand brake lever; three-way gasoline cock (TA3-69); steering column; horn button is mounted on steering column.

#### RUNNING-IN A NEW AUTOMOBILE

Service life of the automobile depends to a considerable extent on the care it receives at initial stages of operation, i. e. during running-in. When running in the automobile during the first 1000 km the following rules should be adhered to:

1. Do not drive the automobile at a speed of over 45 or 50 km/hr in high gear, 25 km/hr in 2nd gear and 15 km/hr in first gear.

2. Do not start the automobile with the engine insufficiently warmed up. Do not race the engine.
3. Do not overload the automobile. Avoid driving over poor roads.
4. When running in the automobile use a less viscous (winter) grade of oil.
5. Check frequently the temperature of brake drums and adjust the brakes if necessary.
6. Check frequently the temperature of wheel hubs and loosen the adjusting nut if the hubs are exceedingly heated.
7. Inspect all the attachments, tighten loose bolts and nuts.
8. Check carefully all piping for leaks and eliminate oil, water and brake fluid leaks.

#### BEFORE THE FIRST RUN

1. Check the water level in the radiator, oil level in the engine crankcase, electrolyte level in the storage battery, brake fluid level in the brake master cylinder, oil level in the air cleaner oil cup, tyre pressure, tightening of wheel nuts.
2. Check the oil level in the transmission housing, transfer case housing, front and rear axle casings.
3. Lubricate all the points of the automobile that should be lubricated every 500 and 1000 km (see Lubrication Chart).
4. Start the engine and check all connections for oil, water and fuel leaks.

#### AFTER 500 KM RUN

1. Replace crankcase oil.
2. Lubricate all the points of the automobile that should be lubricated every 500 and 1000 km (see Lubrication Chart).
3. Tighten wheel nuts, steering arm nuts, universal joint nuts.

#### AFTER 1000 KM RUN (AT THE END OF RUNNING-IN)

1. Remove the seal and take out the limiter washer located between the carburetor and inlet manifold flanges.
2. Tighten the cylinder head stud nuts in the sequence shown in Fig. 4. The nuts should be tightened on a cold engine.
3. Tighten the exhaust manifold to engine and exhaust manifold to muffler attachments.
4. Tighten the generator bracket.
5. Check fan belt tension and adjust if necessary.
6. Check throttle valve and choke actuating parts and adjust if necessary.
7. Inspect and clean fuel pump sediment bowl.
8. Adjust engine idle speed.
9. Check the electrolyte level in the storage battery, add distilled water if necessary.

10. Tighten the terminals and coat them with vaseline.
11. Check condition and connections of electrical wiring.
12. Blow through the generator and starting motor with compressed air and inspect the commutator.

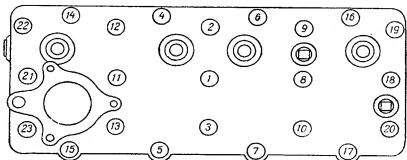


Fig. 4. Cylinder Head Stud Tightening Sequence

13. Adjust the play of the clutch and brake pedals.
14. Check adjustment of foot and hand brakes.
15. Check the fluid level in the brake master cylinder.
16. Tighten rear axle shaft attachment nuts and front axle driving flanges.
17. Tighten the attachments of the following parts: king pin plates, steering levers, transfer case brackets, front axle ball supports, spring clips, spring bolts, shock absorbers and all the other loose attachments.
18. Drain sediment from engine oil filters. Check operation of the coarse oil filter self-cleaner.
19. Change oil in engine crankcase, air cleaner, front and rear axle housings, transmission and transfer case housings.
20. Lubricate all the points that are to be lubricated after 500 and 1000 km (see Lubrication Chart).
21. During the following 3000 km do not drive the automobile continuously at a speed of over 70 km/hr and do not race the engine.

#### STARTING AND STOPPING THE ENGINE

Depending on temperature conditions the engine should be started as follows.

##### STARTING A WARM ENGINE

1. Turn the ignition switch on.
2. Depress the starter pedal and keep it depressed until the engine fires, but not over 5 sec.

If a warm and fully serviceable engine fails to start this may be caused by an exceedingly rich mixture due to choking or pumping of gasoline by the accelerator pedal.

To eliminate over-enrichment blow through the cylinders by smoothly depressing the accelerator pedal and crank the engine by the starting motor.

When starting a very hot engine it is recommended simultaneously with depressing the starter pedal to depress the accelerator pedal for scavenging the cylinders.

##### STARTING A COLD ENGINE AT A TEMPERATURE OVER -5° C

1. Prime the carburetor using the fuel pump hand lever.
2. Pull out the carburetor choke button as far as it will go.
3. Release the clutch, depressing the pedal all the way down.
4. Turn the ignition switch on.
5. Depress the starter pedal and keep it depressed not over 5 sec. The intervals between each application of the starter should not be less than 10 or 15 sec.
6. As soon as the engine starts to fire under its own power, depress the choke button  $\frac{1}{4}$  of its travel and increase engine speed by the accelerator button or pedal.

An engine in good repair is usually started after first or second attempt. As the engine is warmed up, press the choke button in gradually.

If the engine fails to start after three attempts it is necessary to scavenge the cylinders.

As a rule difficult starting of the engine with correct use of the choke is caused by the following:

1. No fuel supply to the carburetor.
2. Breaker point gap out of adjustment or breaker points burned.
3. Faulty or soiled spark plugs.
4. Faulty wiring.

Start the automobile only after warming up the engine. To speed up warming close the radiator blind and hood cover flaps.

##### STARTING A COLD ENGINE AT LOW TEMPERATURES

To ensure prompt and reliable starting of the engine at low temperatures warm up the engine by the use of the starting heater or by filling the engine with hot water and oil.

To start the engine in cold weather the FA3-69 automobile is provided with a starting heater mounted under the hood on the L. H. side of the engine.

Prepare the automobile for starting in the following order:

1. Close the drain cock on the heater boiler and unscrew the boiler filler plug.
2. Light the starting heater torch (Fig. 5.) For this purpose screw in the torch tank plug, turn in the adjusting needle, make a few strokes with the pump, pour some gasoline into the burner cup and light up the gasoline. After 10 min open partly the adjusting needle and close the burner cap.

3. To facilitate placing of the torch into the heater boiler turn the front wheels of the automobile to the extreme right position.  
 4. Remove the access hole cover on the left fender mudguard, reduce the torch flame and place the torch into the fire tube of the heater boiler.

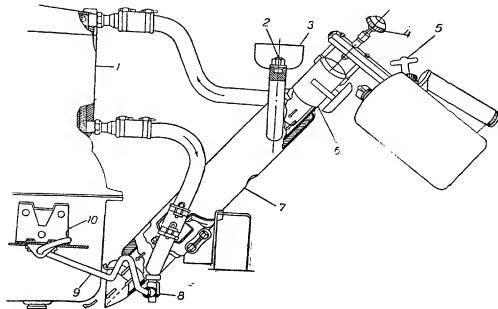


Fig. 5. Starting Heater

- 1 — Cylinder block, 2 — boiler plug, 3 — funnel, 4 — heater torch adjusting needle, 5 — torch pump handle, 6 — torch burner, 7 — heater boiler, 8 — drain cock, 9 — drain cock handle, 10 — drain cock spring.
5. Pour 4 liters of water into the heater boiler to the filter hole level, screw in the plug and increase the torch flame.  
 6. After 20 or 30 min, when the cylinder head is heated to 45 or 50° C, turn the crankshaft by the starting handle.  
 7. Remove the starting heater torch from the heater boiler and open partly the hood to ventilate the space under it.  
 8. Start the engine as described above.  
 9. As soon as the engine fires close the drain cock and fill the cooling system with water.  
 10. Put out the heater torch by unscrewing partly the torch tank filler plug.

**STOPPING THE ENGINE**

After working the automobile under a heavy load allow the engine to run at low idle speed for 2 min before stopping it.  
 The engine is stopped by turning the ignition switch off.  
 When the automobile is to be parked for a long time at a low temperature, drain water from the cooling system. The water is

drained through two cocks: one located on the radiator and the other — on the starting heater boiler. When draining the cooling system remove the radiator filler cap and open the heater cock on the cylinder head.

**MAINTENANCE SCHEDULE**

The life of the automobile will be extended in proportion to the attention paid to the regular maintenance and correct operation of the automobile. The Manufacturer recommends the following maintenance schedule.

**DAILY MAINTENANCE**

1. Check the fuel, water and oil levels and top up to the correct level.
2. Check the fuel, water, oil and brake fluid leaks.
3. Check the presence, good working order and reliability of fastening tools and equipment.
4. Inspect and clean the storage battery, coat the terminals with vaseline and check attachment of cables. Clear ventilation holes.
5. Check fan belt tension.
6. Start the engine, listen to its operation noises, check functioning of the instruments.
7. Check condition of springs and shock absorbers.
8. Check tightening of the wheels. Inspect the tyres and check tyre pressure.
9. Check connection of steering rods.
10. Check service ability of the steering gear, brakes, horns and electric lighting.

**1,000 KM MAINTENANCE**

1. Check fan belt tension.
2. Check functioning of the radiator cap valves.
3. Drain sediment from the sediment bowl.
4. Check connections of the electric wiring.
5. Check electrolyte level in the storage battery and add distilled water if necessary.
6. Check and adjust the play of the clutch and brake pedals.
7. Check and adjust the foot brake.
8. Check the level of the brake fluid in the brake master cylinder.
9. Check attachments of the steering gear case, steering levers, steering arm, generator bracket.
10. Lubricate the automobile in accordance with Lubrication Chart.

**3,000 KM MAINTENANCE**

1. Perform operations listed in 1,000 km maintenance.
2. Inspect the tyres. Interchange the wheels together with tyres. Adjust wheel toe-in.

#### 6,000 KM MAINTENANCE

1. Perform all operations listed in 3,000 km maintenance.
2. Tighten the exhaust manifold and muffler attachments.
3. Inspect fuel pump attachments, condition of the flexible hose and check all connections for tightness.
4. Drain sediment from the fuel tanks.
5. Clean the breaker points and adjust gap. Check ignition timing.
6. Inspect the spark plugs and adjust spark plug gap.
7. Tighten the generator bracket fastenings.
8. Check functioning of the radiator cap valves.
9. Check operation of the governor.
10. Inspect condition of electric wiring.
11. Inspect condition of generator and starter brushes and commutator. Blow out the generator and starter and clean their commutators.
12. Check horn attachment.
13. Check head lamp adjustment.
14. Remove the wheel hubs, clean the brakes and change lubricant in wheel hubs. Check and adjust backlash in the steering knuckle and king pins.
15. Tighten brake plate attachments. Adjust wheel bearings.
16. Inspect condition of steering rod heads.
17. Inspect condition of the shock absorbers, add fluid, if necessary.
18. Remove and blow out the front axle and rear axle breathers, also the transfer case and transmission breathers.
19. Inspect condition of the propeller shafts, their joints and connections.
20. Check and adjust the hand brake.
21. Check and adjust toe-in of the front wheels.
22. Check condition of the spring rubber bushes.
23. Remove the propeller shafts and tighten flange attachments, check and adjust the axial play in the bearings of the front axle and rear axle drive gears and in the bearings of the transfer case lower shaft.
24. Check fastening of the body parts.
25. Lubricate the automobile in accordance with Lubrication Chart.

#### 12,000 KM MAINTENANCE

1. Perform all operations listed in 6,000 km maintenance.
2. Disassemble and clean the carburetor. Check the fuel level in the float chamber. Adjust closing of the choke valve, and idle speed and the main jet needle as well.
3. Check crankcase vent pipes and inlet manifold and remove dirt deposits.
4. Remove and clean the coarse oil filter.
5. Check functioning of the centrifugal and vacuumatic spark advance mechanisms.

6. Remove the starting motor, disassemble, clean and lubricate.
7. Remove and clean the fuel sediment bowl.
8. Inspect wheel hub bearing, change lubricant and clean the brake system as follows:
  - a) Remove wheel hubs.
  - b) Flush out the hubs, steering knuckles and bearings and check their condition.
  - c) Clean and wipe the brake drums and plates.
  - d) Disassemble and clean the wheel brake cylinders. Flush the piping with alcohol or brake fluid. Lubricate the pistons with castor oil or brake fluid.
  - e) Check wear of brake linings.
  - f) Remove the front wheel brakes' steering knuckles; remove the joints and change lubricant.
  - g) Tighten the attachments of the steering rods and levers and the attachment of the rear brakes to the axle shaft housing flanges.
  - h) Pack the hubs with fresh grease and put them in place.
  - i) Adjust wheel bearings.
  - j) Fill the brake system with fluid and bleed the system.
9. Lubricate the automobile in accordance with Lubrication Chart.

#### SEASONAL MAINTENANCE

1. In accordance with Lubrication Chart change oil in the engine crankcase, transmission, transfer case, steering gear and front and rear axles.
2. In autumn clean and flush out the body heating system.
3. Change specific gravity of electrolyte according to the season.

#### YEARLY MAINTENANCE

1. Remove the shock absorbers, take out the valves, flush out the valves and body.
2. Remove the springs, disassemble them and lubricate. Inspect rubber bushes.
3. Remove the upper cover of the transfer case, check axial play of the countershaft. If a considerable play is discovered, remove the rear cover and adjust the play using adjusting shims. Check the axial play in the bearings of the lower shaft and adjust the play using adjusting shims.
4. Remove the main brake, disassemble, clean, lubricate and adjust the shoe to drum clearance.

### LUBRICATION

The Lubrication Chart is shown in Fig. 6. The Chart comprises all the points to be lubricated, lubrication intervals and grades of lubricant used. Symmetrical lubrication points located on the opposite side of the automobile are shown in dotted lines. Figures indicate lubrication intervals expressed in kilometers of operation. When operating the automobile over dusty roads lubricate all 1,000 km points every 500 km. Lubricant grades are shown on the Chart by letters, the meaning of which is explained in the Table below.

#### LUBRICANT TABLE

Symbol	Summer Grade (over + 5°C.)	Winter Grade (below + 5°C.)
M	Industrial oil Grade 50 Engler viscosity 5.76 - 7.86° at 50°C.	Mixture of industrial oil Grade 50 (60 per cent) and spindle oil Grade AV (40 per cent) Engler viscosity 3.5 - 4.5° at 50°C.
H	Transmission oil	
C	Grease. Melting point 75°C. Penetration 270-330 at 25°C.	Grease. Melting point 70°C. Penetration 330-360 at 25°C.
Y	Universal, water-resistant grease with high melting point (120°). Penetration 175-210 at 25°C.	
T	Brake fluid (Substitute 50 per cent castor oil and 50 per cent alcohol).	
A	Spindle oil Grade AV. Engler viscosity 2.05-2.26° at 50°C.	
Γ	Graphite lubricant	
AM	Grease. Melting point 115°C. Penetration 220-270 at 25°C.	

#### EXPLANATORY NOTES TO LUBRICATION CHART

1. Engine crankcase. Check oil level daily. Change oil every 1,500 or 2,000 km.
2. Steering gear case. Check oil level and top up, if necessary. Change oil in spring and fall.
3. Generator — 2 oilers, 5 drops each.
4. Front wheel hub bearings. Change lubricant.
5. Steering knuckle pin.
6. Coarse oil filter. Drain sediment when changing crankcase oil.
7. Ignition distributor. Rotate oiler on distributor body one turn. Apply 1 or 2 drops of engine oil on breaker arm pivot and cam brush.

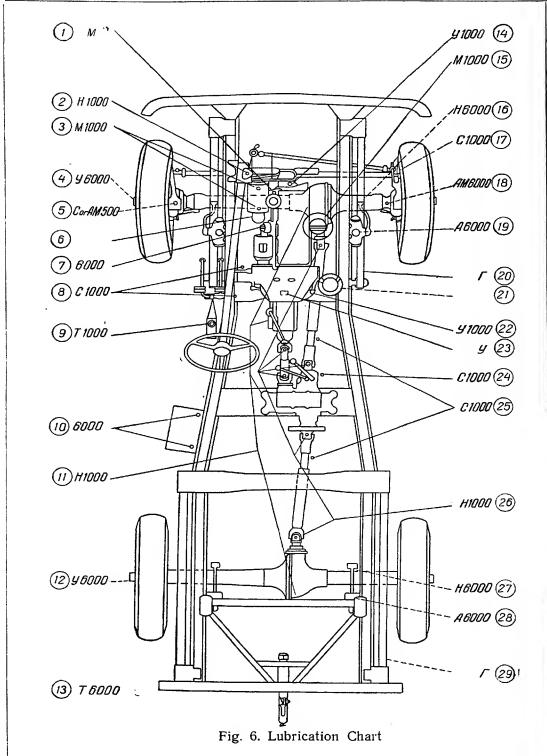


Fig. 6. Lubrication Chart

8. Pedal shaft and clutch release drive shaft.

9. Brake master cylinder. Check fluid level and bring it to 20 mm below filler hole rim. Do not use mineral oils.

10. Storage battery terminals. Coat with vaseline at least twice a year.

11. Transmission, transfer case, front and rear axle casings. Check oil level and top up, if necessary. Change oil every 6000 km and every spring and fall.

12. Rear wheel hub bearing. Change lubricant.

13. Accelerator shaft bearings — 2 or 3 drops.

14. Water pump bearings.

15. Carburettor air cleaner. Flush out and change oil. Under severe dust conditions clean daily.

16. Shock absorber bracket hinges.

17. Steering rod joints.

18. Steering knuckle joints. Add 150 g. In spring and fall or every 12,000 km flush out knuckles and pack 300 g of lubricant.

19. Front shock absorber housings. Add fluid. Once a year remove, flush out and replace fluid.

20. Front spring leaves. Lubricate when necessary but not less than twice a year.

21. Fine oil filter. Drain sediment every 1000 km and each time when changing crankcase oil. Replace filter element every 1,500 or 2,000 km simultaneously with changing crankcase oil.

22. Clutch release bearing. Turn oil cup cover two or three turns.

23. Drive gear shaft bearing. Pack with lubricant during overhaul.

24. Transfer case lever shaft.

25. Splines of front and rear propeller shafts. 2 or 3 shots of a grease gun.

26. Joints of front, rear and intermediate propeller shafts. Lubricate with fluid oil only.

27. Shock absorber bracket hinges.

28. Rear shock absorber housings. Add fluid. Once a year remove, flush out and refill.

29. Rear spring leaves. Lubricate when necessary but not less than twice a year.

In addition to operations listed in Lubrication Chart do the following:

1. Every 2,000 km change engine crankcase oil. If the filter element has not been replaced and the crankcase oil becomes cloudy, change oil every 1,000 km. Drain oil from the crankcase and filters immediately after stopping the engine. Simultaneously with changing the crankcase oil clean both oil filters.

2. If the engine crankcase becomes excessively dirty flush it out with fluid oil. To do this pour in 3 litres of oil, remove the spark plugs

and turn the crankshaft in the course of 1 or 2 min. Drain and refill with fresh oil.

3. Simultaneously with changing crankcase oil replace fine oil filter element.

4. Change oil in the air cleaner simultaneously with changing the crankcase oil. If the air cleaner, screen becomes clogged flush it out in kerosene, blow out with compressed air and dip in fresh oil. When working over dusty roads change oil in the cup daily.

5. Pack water pump bearings with lubricant until it oozes through the check hole. Wipe off excess lubricant.

6. In spring and fall change lubricant in the cases of transmission, transfer case, front and rear axles. If the oil is heavily contaminated, flush out the cases with kerosene. To flush — pour 1 or 1.5 liters of kerosene into the case, jack up the wheels, start the engine and allow it to run for 2 or 3 min, then drain kerosene and refill with fresh oil.

Refill the cases of the transmission, transfer case, front and rear axles to the level of the filler plugs, using a special oil gun.

7. Every season change oil in the steering gear case. To drain — remove the lower R. H. bolt of the front cover. Refill to the level of the filler plug.

8. Universal joints of the needle bearing type are lubricated with fluid oil. Force the oil in by an oil gun fitted with a special end piece until the oil appears from the valve located on the crosspiece.

Lubricate the propeller shaft splines by applying two or three shots of the lubricating gun.

9. The pin of the transfer case levers, shock absorber bracket joints, steering rod pivots and pedal shaft should be packed with grease until it oozes from the joints.

10. When changing lubricant in wheel hubs, flush out the hubs and bearings, then pack the bearings and hub with grease. The layer of lubricant in the hub should be 10 to 15 mm thick.

11. The pivots of the front and rear shock absorber brackets should be lubricated simultaneously with wheel hubs because access to bracket grease fittings is possible with removed wheels only. Every 6,000 km apply two or three shots of lubricating gun using fluid lubricant; remove excess lubricant.

12. Clutch release bearing should be lubricated by screwing in the lubricator cap two or three turns.

13. Every 6,000 km add fluid into the shock absorbers to the filler plug level. Once a year remove the shock absorbers and flush them out with gasoline. Place new 0.8 mm gaskets under valve plugs.

14. As the lubricant in the oil cups of the clutch release bearings and distributor shaft is used up, remove the oil cups and pack with fresh lubricant.

15. Fill the distributor oil cup with lubricant. Apply engine oil to the breaker arm pivot and felt wick.

## CARE AND SERVICE ADJUSTMENTS

### ENGINE

The automobile is powered with a four cylinder, four-stroke cycle gasoline engine. The design of the engine is shown in Figs. 7 and 8

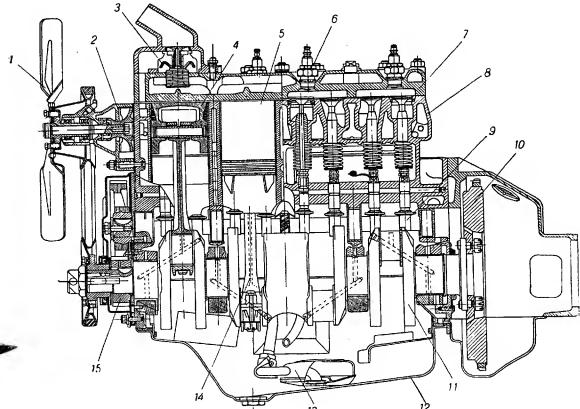


Fig. 7. Engine Longitudinal Section

1 — fan, 2 — water pump, 3 — thermostat, 4 — piston, 5 — cylinder liner, 6 — spark plug, 7 — cylinder head, 8 — cylinder block, 9 — camshaft, 10 — flywheel, 11 — crankshaft, 12 — crankcase, 13 — oil suction belt, 14 — connecting rod, 15 — timing gears.

### CARE OF THE ENGINE

1. Tighten cylinder head bolt nuts every 1,000 km and after each removal of the cylinder head.
2. Remove carbon deposits from the cylinder head and piston crowns.
- Formation of carbon may be diagnosed by detonation noises, engine overheating, loss of power, excessive gasoline and oil consumption.
- Remove the cylinder head and scrape off the carbon deposits.

3. Every 40,000 to 50,000 km the piston rings and connecting rod bearing shells should be replaced by new parts of repair size. Worn piston rings cause loss of power, increase oil consumption, reduce

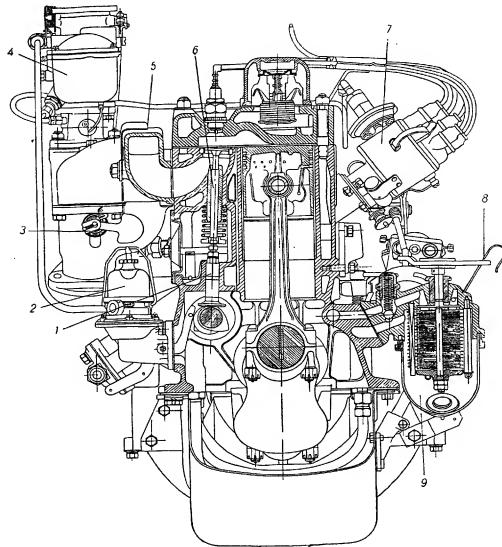


Fig. 8. Engine Cross Section

1 — valve filter, 2 — fuel pump, 3 — mixture heating regulator, 4 — carburetor, 5 — manifold, 6 — valve, 7 — ignition distributor, 8 — oil dipstick, 9 — coarse oil filter.

compression, result in heavy smoking through crankcase vent hole; besides, the carburetor becomes restricted with resinous residue.

When replacing piston rings remove carbon deposits from the piston ring grooves and from the holes in the oil control ring grooves.

Depending on the degree of wear the connecting rod shells must be replaced by new standard or 0,05 mm undersized shells.

4. If valve knocking is discovered adjust the valve to lifter clearances in the following sequence:

- Jack up the front axle, place it on some support, remove the right front wheel and mudguard;
- Remove the valve box covers;
- Bring No. 1 piston to TDC on the compression stroke, turning the crankshaft until the ball on the flywheel coincides with the pointer on the clutch housing;
- Check the clearances of No. 1, 2, 4 and 6 valves by a feeler gauge. On a cold engine the clearances should be 0.23 mm for inlet valves and 0.28 mm for exhaust valves. On a warm engine — 0.20 mm and 0.25 mm, respectively;
- To adjust clearances hold the lifter by a wrench, loosen the lock nut and turn the adjusting screw, as necessary. Having adjusted the clearance tighten the lock nut and recheck clearance.
- Turn the crankshaft through one complete revolution. Check and adjust the clearances of the remaining valves, if necessary.

#### COOLING SYSTEM

The engine is equipped with a forced water circulation system. To maintain normal engine operating temperature (80 to 90°C) and to improve warming up, the cooling system is equipped with a thermostat located in the cylinder head pipe union and a radiator blind controlled by the handle from the driver's seat. Pulling the handle out closes the blind, and pressing it in opens the blind.

The thermometer unit for the control of engine temperature is installed in the cylinder head. Besides, there is a green tell-tale light flashing on when the temperature of water increases up to 92—98°C.

To reduce formation of scale fill the cooling system with soft water with small salt content.

In winter it is recommended to use liquids with a low freezing point — «antifreeze», consisting of ethylene-glycol (55 per cent) and water.

When the automobile is parked for a long time in a cold place drain water from the cooling system through two cocks: one located on the lower radiator tank, and the other — on the starting heater tank. When draining remove the radiator cap.

The radiator cap (Fig. 9) seals the radiator hermetically, and connects the cooling system with outside air through two valves. The steam outlet valve opens at an over-pressure of 0.28 to 0.38 kg/sq. cm. The inlet valve opens when the vacuum in the system reaches 0.01 to 0.12 kg/sq. cm and admits outside air.

The water pump (Fig. 10) is of a centrifugal type. It is sealed by a self-adjusting seal. Dribbling of water through the check hole shows

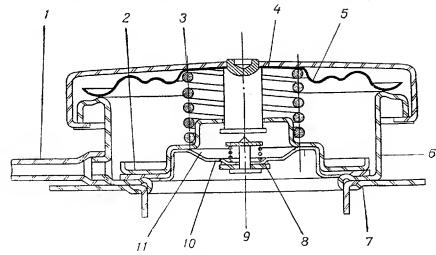


Fig. 9. Radiator Filler and Cap  
1 — control pipe, 2 — outlet valve, 3 — outlet valve spring, 4 — cap body, 5 — lock spring, 6 — radiator filler neck, 7 and 8 — gaskets, 9 — inlet valve, 10 — inlet valve spring, 11 — inlet valve body.

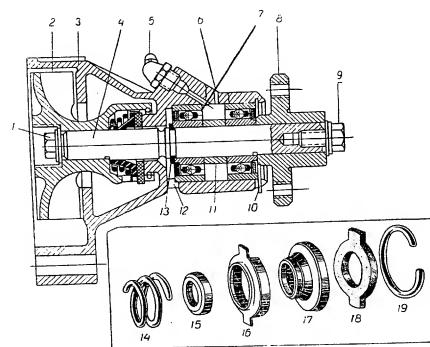


Fig. 10. Water Pump  
1 — impeller attachment bolt, 2 — impeller, 3 — water pump body, 4 — shaft, 5 — grease fitting, 6 — bearing, 7 — pump bearings, 8 — lock washer, 9 — lock nut, 10 — bearing outer retainer ring, 11 — bearing, 12 — water drain hole, 13 — inner retainer ring, 14 — inner retainer, 15 — inner seal case, 16 — outer seal case, 17 — rubber seal spring, 18 — textolite washer, 19 — seal retainer ring.

that the seal needs servicing. The water pump bearings are lubricated through a grease fitting until the lubricant emerges from the joints.

To repair the seal remove the water pump from the engine and press out the pump impeller together with the seal using the puller tool shown in Fig. 11.

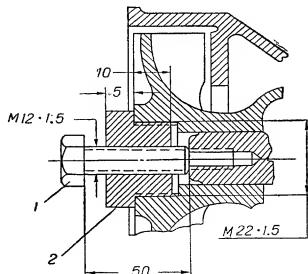


Fig. 11. Removing Water Pump Impeller  
1 — puller screw, 2 — puller nut.  
Dimensions are shown in mm.

To facilitate the starting of the engine in winter the automobile is equipped with a starting heater installed on the left-hand side of the engine.

The care of the cooling system is confined to regular removal of scale, adjustment of fan belt tension and regular lubrication of the water pump bearing.

It is recommended to flush out the system by a powerful jet of clean water with disconnected hoses. The radiator should be flushed out through the lower pipe union. The engine water jacket should be flushed out through the upper pipe union with the thermostat removed.

Fan belt tension is adjusted by turning the generator. The normal slack of the belt is 12 to 20 mm.

#### LUBRICATING SYSTEM (Fig. 12)

The engine is provided with a lubricating system of a combination type. The crankshaft and camshaft bearings and valve lifters are forced lubricated. Other parts are splash lubricated.

The oil is poured into the engine crankcase through the filler pipe closed hermetically by the cap. From the crankcase the oil is drawn through the floating oil suction bell into the gear oil pump installed

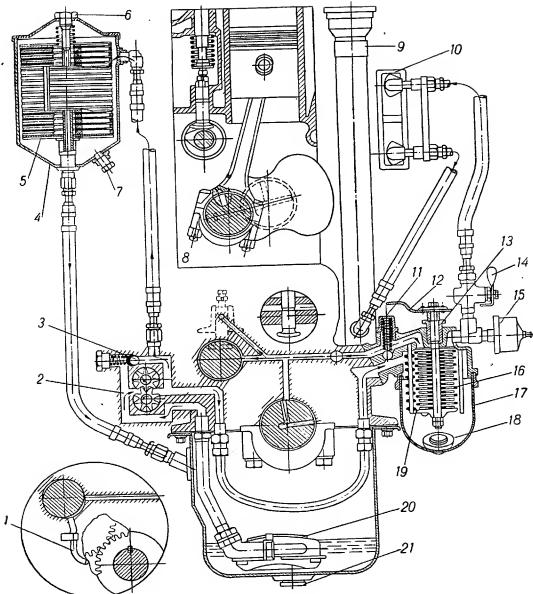


Fig. 12. Engine Lubrication Diagram  
1 — timing gear lubricating pipe, 2 — oil pump, 3 — relief valve, 4 — fine oil filter, 5 — filter sediment bowl, 6 — drain plug, 7 — lubrication of camshaft cams and tappets, 8 — cylinder wall, 9 — oil filter pipe, 10 — oil cooler, 11 — bypass valve, 12 — coarse oil filter lever, 13 — seal, 14 — oil cooler cock, 15 — oil pressure gauge unit, 16 — coarse oil filter, 17 — filter plates, 20 — oil suction bell, 21 — crankcase drain plug.

on the outside of the engine crankcase and developing a pressure of 2 to 4 kg/sq. cm. The oil is filtered twice, in coarse and fine oil filters. The coarse oil filter is cleaned automatically each time the starter button is depressed. The crankcase ventilation is of a forced type. The ton is depressed. The crankcase ventilation is of a forced type. The ton is depressed.

cooling of oil is ensured by the oil cooler controlled by the cock installed near the coarse oil filter. Operation of the lubricating system is controlled by the oil pressure gauge.

There are two valves in the engine lubricating system: the relief valve installed on the oil pump cover which limits maximum pressure;

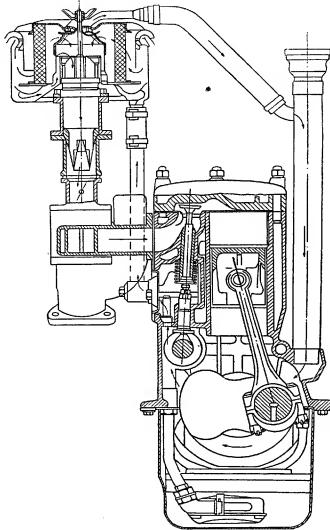


Fig. 13. Engine Crankcase Ventilation

and the bypass valve located on the coarse oil filter, which ensures circulation of oil should the filter become clogged.

A sudden oil pressure drop may be caused by the blockage of the relief valve. In this case remove the oil pump cover, dismantle and flush out the relief valve. Before replacing the pump cap lubricate the pump gears with grease, otherwise the pump will not draw the oil from the crankcase.

The crankcase oil level is measured by the oil dipstick. The oil level should be between the « $Q$ » and « $\Pi$ » marks.

The oil cooler should be turned ON in summer and when the engine is working under heavy load.

The replaceable element of the fine oil filter should be changed each time when the crankcase oil is changed or at an earlier date when the oil shows an evidence of being murky or cloudy.

Replace the filter element as follows:

1. Mark the position of the filter cap on the body, and remove the cap.
2. Remove the drain plug, drain sediment and wipe the body.
3. Replace the filter element, screw IN the plug and refill the filter with fresh oil.
4. Check condition of the body cap gasket and change it if necessary.
5. Replace the cap.
6. Add oil into the engine crankcase to the « $\Pi$ » mark on the dipstick.

7. Start the engine, check for oil leaks and add oil to the « $\Pi$ » mark.

Engine crankcase ventilation (Fig. 13) operates due to a difference in the vacuum in two points of the air cleaner to which inlet and outlet tubes are connected. Ventilation cleans the crankcase from gasoline vapours and exhaust gases that break through the piston rings.

Do not operate the engine with insufficiently tight ventilation system as this will result in dust getting inside the crankcase.

Check the ventilation system regularly for tightness and remove sludge.

A normal engine oil pressure should be 2 to 4 kg/sq.cm at a speed of 45 km/hr. On a cold engine the pressure may reach 4.5 kg/sq.cm and drop down to 1.5 kg/sq.cm in hot weather. At low idle speed the minimum oil pressure should be equal to at least 0.5 kg/sq.cm.

A drop of pressure below 1.0 kg/sq.cm at medium speed shows that something is out of order in the system.

#### FUEL SYSTEM (Fig. 14)

The fuel system consists of fuel tanks, filter-sediment bowl, fuel pump, carburettor, air cleaner, inlet manifold and connecting pipes.

The automobile is equipped with either two fuel tanks (ГАЗ-69) or one fuel tank (ГАЗ-69А). The tanks are equipped with air-tight caps provided with double valves which prevent loss of gasoline vapours. The tank is equipped with a shut-off valve, two gasoline level indicators (dipstick and electric type) and a drain plug. With a two-tank arrangement a three-way cock is installed used for switching over from the main tank to the auxiliary tank. The care of the tank consists in regular inspection and flushing out of the cap valves; draining sediment and flushing out the tank.

The filter-sediment bowl of a plate type is installed on the left-hand side of the automobile frame. The care of the sediment bowl consists in regular draining of sediment through the drain plug and periodical washing of the filter element.

The fuel pump of a diaphragm type has a hand lever for priming gasoline. On the running engine the hand priming lever should be held down by a spring.

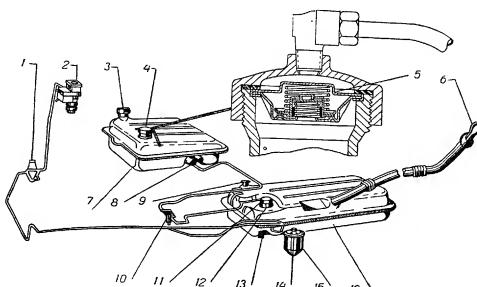


Fig. 14. Fuel System

1 — fuel pump, 2 — carburetor, 3 and 5 — fuel tank filter caps, 4 — valve pipe plug, 5 — inlet and outlet valve assembly, 7 — auxiliary tank, 8 — shut-off valve, 9 — gasoline level dipstick, 10 — three-way cock, 11 — outlet pipe, 12 — gasoline level indicator rheostat, 12 — tank drain plug, 14 — filter-sediment bowl drain plug, 15 — filter-sediment bowl, 16 — main fuel tank.

The care of the fuel pump consists in regular washing of the screen filter installed in the upper part of the pump and replacement of the cork gasket, should it become damaged.

The automobile is equipped with a K-22Д down-draft carburetor with automatic mixture control effected by two jets and elastic Venturi plates. The carburetor is fitted with an acceleration pump, economizer mechanically driven from the throttle valve, and a needle for adjusting the carburetor under operational conditions. The diagrammatic view of the carburetor is shown in Fig. 15.

The carburetor has a provision for four types of adjustment: the main metering system is adjusted by turning the needle of the main jet; the acceleration pump is adjusted by means of the pump drive rod; the economizer is adjusted by screwing the nut on the acceleration pump rod; and the idle speed is adjusted by the screw located in the idle speed passage and the screw controlling the opening of the throttle valve.

The economizer starts to operate when the throttle valve lever is 6.2—6.8 mm short of the stop. The moment of switching on of the economizer is adjusted by turning the nut on the acceleration pump rod. See that the economizer drive rod is connected to the end hole of the lever.

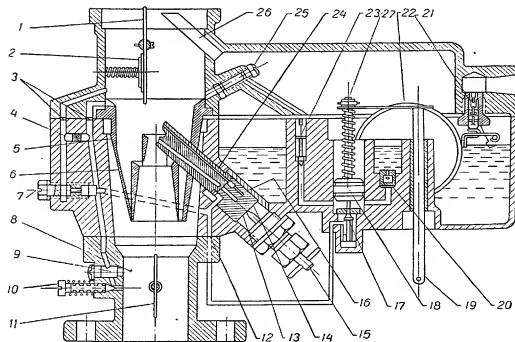


Fig. 15. Carburetor Diagram

1 — choke, 2 — choke safety valve, 3 — idle speed air jets, 4 — idle speed emulsion jet, 5 — Venturi block, 6 — Venturi spring plates, 7 — idle speed jet, 8 — vacuumatic governor tube hole, 9 — idle system upper outlet opening (slot), 10 — idle speed adjusting screw, 11 — throttle valve, 12 — float chamber needle valve, 13 — main jet, 14 — atomizing jet, 15 — main jet adjusting needle, 16 — jet block, 17 — economizer valve, 18 — acceleration pump piston, 19 — acceleration pump drive rod, 20 — acceleration pump return valve, 21 — float chamber needle valve, 22 — valve, spring and rod, 22 — float, 23 — acceleration pump valve, 24 — atomizer block, 25 — acceleration pump jet, 26 — balancing tube, 27 — economizer adjusting nut.

Adjustment of the idle speed is carried out on a warmed-up engine subsequent to checking the ignition system.

Turning the throttle valve screw IN (Fig. 16) opens the throttle and increases engine speed. Turning the idle speed screw OUT increases the quantity of the fuel mixture.

Before making adjustments, turn the throttle valve screw IN  $1\frac{1}{2}$  or 2 turns and turn the idle speed screw OUT also  $1\frac{1}{2}$  or 2 turns.

To adjust:

1. Turn the throttle valve screw OUT to set the minimum steady idle speed.

2. Turning the idle speed screw IN, make the mixture leaner until the engine begins to misfire, then back it off a little for smooth engine performance.

3. Check adjustment by depressing the accelerator pedal and releasing it abruptly. If the engine stalls increase engine speed by turning the throttle valve screw IN  $\frac{1}{2}$  of a turn.

The working mixture is heated by the exhaust gases in the middle part of the inlet pipe. Intensity of heating is controlled by the choke operated automatically by means of a bimetal spring and weight.

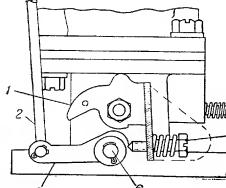


Fig. 16. Linkage from Choke to Throttle Valve

1 — throttle valve lever, 2 — choke to throttle rod, 3 — lever with cam, 4 — screw adjusting opening of throttle valve at idle speed, 5 — idle speed adjusting screw, 6 — pin.

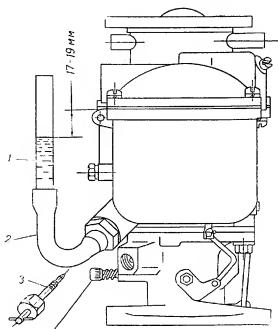


Fig. 17. Measuring Gasoline Level in Float Chamber

1 — glass tube, 2 — rubber pipe, 3 — adjusting needle, 4 — idle speed screw

Fuel consumption during operation depends on the condition of the automobile and proper adjustment of the fuel system.

Condition of the running gear can be determined to a considerable extent by free running. The automobile running over a level road at a speed of 30 km/hr must cover at least 150 m from the time the clutch is released to the complete stop.

The length of the free run depends on the lubrication of the running gear, adjustment of wheel bearings and brakes, and condition of tyres.

Fuel consumption is considerably influenced by correct setting of the ignition advance angle. The ignition should be set so that with the engine running on gasoline of 66—70 octane number, infrequent detonation knocks will be heard if the automobile has been accelerated in first gear by abrupt depression of the accelerator pedal.

To bring fuel consumption to a minimum it is necessary to adjust properly the opening of the carburettor main jet needle. It is recom-

mended that the needle be opened  $1\frac{1}{2}$  or 2 turns, depending on operational conditions.

Adjust correct gasoline level in the float chamber. Checking is effected by means of two tubes made of rubber and glass screwed into an opening in the adjusting needle (Fig. 17). Normally, the gasoline level should be 17 to 19 mm below the carburettor split surface. To change the level bend the tongue on the lever to which the float is soldered.

The care of the carburettor consists in regular washing and blowing out of jets, cleaning the Venturi plates from deposits, inspecting the gaskets and checking carburettor adjustments.

#### IGNITION SYSTEM

The ignition system consists of a 12 V storage battery, generator, ignition switch, ignition coil, distributor-breaker and spark plugs. The ignition wiring system is shown in Fig. 18.

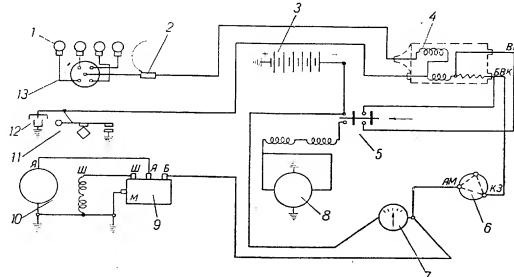


Fig. 18. Ignition Wiring System

1 — spark plugs, 2 — suppressor resistor, 3 — storage battery, 4 — ignition coil, 5 — voltage regulator, 6 — generator, 7 — breaker, 8 — condenser, 9 — current and voltage regulator, 10 — distributor, 11 — breaker, 12 — condenser, 13 — distributor.

The spark plugs of M12V type with  $18 \times 1.5$  mm thread are used. When replacing a spark plug see that the length of the threaded part does not exceed 12 mm. A normal electrode gap is 0.7 to 0.8 mm. Adjust the spark plug gap by bending the side electrode only.

The ignition coil of B1 type is equipped with an additional resistor closed by the starter switch during engine starting.

The H. T. circuit includes suppressor resistors to reduce radio interference created by the operation of the ignition system.

The P-20 distributor with the centrifugal and vacuumatic spark

advance control and octane-selector (Fig. 19) is installed on the L. H. side of the engine being driven by the oil pump shaft.

The care of the ignition system consists in regular inspection of spark plugs, adjustment of the spark plug gap, replacement of faulty

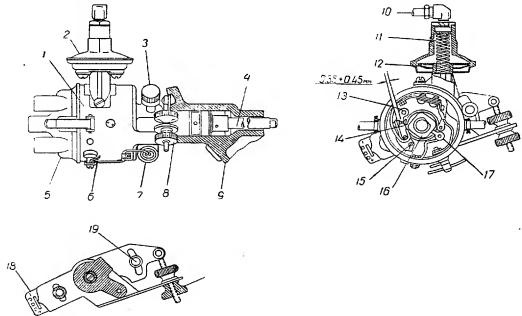


Fig. 19. Distributor

1 — distributor body, 2 — vacuumatic spark advance unit body, 3 — oiler, 4 — distributor shaft, 5 — cylinder block, 6 — vacuumatic unit tube, 7 — condenser, 8 — octane selector plate, 9 — cylinder block, 10 — vacuumatic unit tube, 11 — spring, 12 — vacuumatic unit diaphragm, 13 — breaker fixed contact plate screw, 14 — breaker arm, 15 — adjusting eccentric screw, 16 — breaker cam, 17 — left wick, 18 — octane selector scale, 19 — distributor to cylinder block attachment screw.

or soiled spark plugs, checking and adjusting the breaker point gap, cleaning the breaker points, setting the ignition, timely lubrication of the distributor and servicing the current source and wiring (see Electric Equipment Section).

To adjust the breaker point gap crank the engine by the starting handle to set the breaker points to maximum opening position, then loosen the screw of the fixed contact plate and turn the adjusting eccentric screw to set the required clearance by means of a feeler gauge.

While adjusting inspect and clean the points by a special plate included in the Driver's Kit.

The ignition is set using the notches on the flywheel. A ball pressed into the flywheel corresponds to TDC in cylinder No. 1. In addition there are divisions  $\pm 12^\circ$  from TDC.

Set the ignition as follows:

1. Remove the distributor cap and check the breaker point gap.
2. Remove the cover of the access hole on the flywheel near the starter.

3. Remove No. 1 spark plug.

4. Place the thumb over the spark plug hole and crank the engine slowly until the compression stroke is felt.

5. Continue to crank the engine slowly until the notch on the flywheel (marked by figure 4) is lined up with the pointer on the clutch housing.

6. Disconnect the tube of the vacuumatic control.

7. Remove the distributor cap and make sure that the rotor contact lines up with No. 1 spark plug contact in the distributor cap.

8. Set the octane selector to the zero division by means of adjusting nuts.

9. Loosen the distributor to cylinder block attaching screw and turn the distributor body clockwise so as to close the contacts.

10. Switch ON the inspection lamp, connecting one lead to the ground and the other one to the L. T. terminal of the ignition coil.

11. Turn the ignition switch ON and rotate slowly the distributor body counter-clockwise until the lamp flashes up.

12. Secure the distributor body to the cylinder block by screws, replace the distributor cap and insert the central cable. Inspect the order of H. T. cable connection, beginning with cylinder No. 1. The cables should be connected in the order 1—2—4—3 in a clockwise direction.

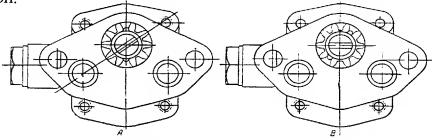


Fig. 20. Position of Oil Pump Shaft Slot

(viewed from above)

A — prior to installation in cylinder block.

B — after installation.

The final adjustment of ignition setting is carried out during road tests with the engine running on gasoline of 66—70 octane number. For this purpose drive the warmed up automobile in high gear at a speed of 25—30 km/hr and depress sharply the accelerator pedal as far as it will go. If weak detonation knocks are heard, the ignition is now considered timed. If detonation is strong turn the distributor body clockwise one division of the octane-selector scale. If there is no detonation turn the distributor body counter-clockwise.

If the oil pump has been removed from the engine, correct coupling of its shaft with the distributor shaft should be achieved by installing the oil pump as follows:

1. Bring the engine crankshaft to a position corresponding to TDC on the compression stroke in cylinder No. 1.

2. Turn the oil pump shaft so that its slot is brought to the position shown in Fig. 20,A.

3. Put the oil pump in place carefully so that the pump gears will mesh with the camshaft gear, the pump shaft will turn and the slot for the distributor shaft lug will take a horizontal position, shown in Fig. 20,B.

#### POWER TRANSMISSION

The power transmission of the automobile comprises the clutch, transmission, transfer case, propeller shaft, front and rear axles.

##### CLUTCH (Fig. 21)

The clutch is of the dry, single plate type with a vibration damper. The care of the clutch consists in adjusting the play of the clutch pedal and regular lubrication of the release collar bearing, release

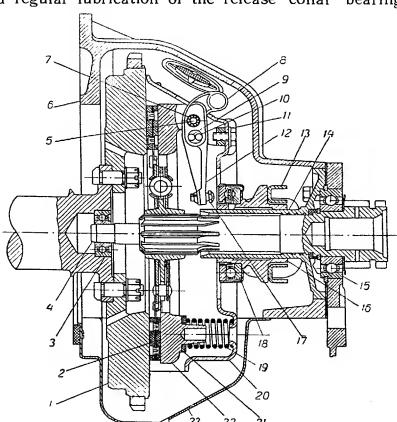


Fig. 21. Clutch

1 — flywheel, 2 — driven plate, 3 — clutch shaft front bearing, 4 — clutch shaft, 5 — weights, 6 — pin, 7 — roller, 8 — pull back lever bracket, 10 — pull back lever, 11 — engagement fork, 12 — front transmission gear, 13 — bearing, 14 — engagement sleeve, 15 — engagement lever, 16 — adjusting screw, 17 — thrust bearing, 18 — spring, 19 — housing, 21 — washer, 22 — pressure plate, 23 — clutch lower housing.

shaft and clutch pedal pin. The play of the clutch pedal should be 38 to 45 mm. Play is adjusted by changing the length of the pusher connecting the release yoke with the clutch release shaft lever (Fig. 22). Adjustment by the use of the pull back lever adjusting bolt should be avoided.

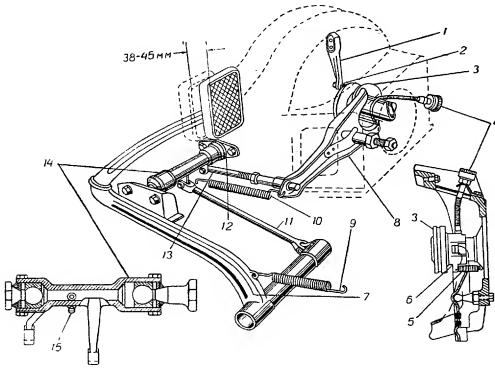


Fig. 22. Clutch Release Linkage

1 — pull back lever, 2 — pull back lever adjusting screw, 3 — thrust bearing, 4 — oiler, 5 — release collar retracting spring, 6 — release collar, 7 — clutch pedal, 8 — release fork, 9 — clutch pedal return spring, 10 — release fork pull back spring, 11 — clutch release shaft rod, 12 — clutch release shaft bracket support on engine, 13 — release fork pusher, 14 — clutch release shaft, 15 — shaft oiler.

The clutch release bearing is lubricated through an oil cup located on the R. H. side of the clutch housing. The release shaft and clutch pedal pin are lubricated through grease fittings.

##### TRANSMISSION (Figs. 23 and 24)

The two-range gearbox has three speeds forward and one reverse. The constant mesh and 2nd speed gears have helical teeth, while the 1st speed and reverse speed gears have straight teeth. The 2nd and high gears are fitted with synchronizers. The gear shift mechanism and lever are mounted in the side cover.

To ensure proper synchronizer operation and noiseless shifting of gears the gear shift lever should be moved smoothly, without jerks. Shift from the 2nd speed to the 1st only after reducing the automobile speed down to 5 km/hr.

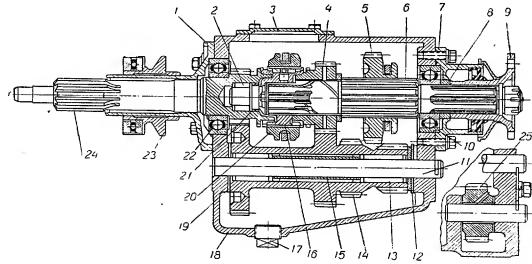
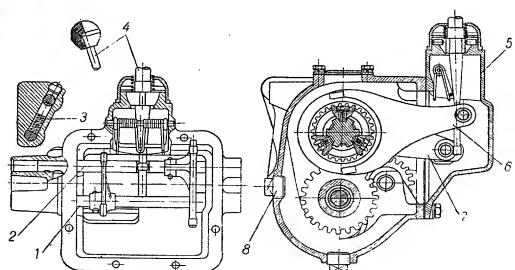


Fig. 23. Transmission. Longitudinal Section

1 — front bearing cap, 2 — roller bearing, 3 — upper cover, 4 — 2nd speed gear, 5 — 1st speed gear, 6 — main shaft, 7 — rear cover, 8 — bearing spacer, 9 — countershaft pivot, 10 — thrust washers, 11 — ball bearing, 12 — countershaft, 13 — synchronizer hub, 14 — roller bearing, 15 — clutch hub, 16 — synchronizer sleeve, 17 — roller bearing locking ring, 18 — transmission case, 19 — 2nd and 3rd speed synchronizer, 20 — drive gear shaft, 21 — reverse speed gear.

Fig. 24. Gear Shift Mechanism  
1, 2 — gear shift shaft, 3 — lock, 4 — gear shift lever, 5 — gear shift mechanism cover, 6, 7 — shift forks, 8 — case check plug.

The care of the transmission consists in changing the oil every 6,000 km of operation, and seasonal replacement of oil (in spring and fall) as well as in regular checking of the oil level and topping up after 1,000 km of operation.

The oil level in the transmission housing should be at the lower edge of the control plug.

#### TRANSFER CASE (Fig. 25)

The transfer case serves to transmit engine torque to the rear and front axles and to increase traction of the wheels. The case has two low gears with 1.15 and 2.78 ratios. Control of the transfer case is by two levers. The left-hand lever disengages the front axle (forward position) and engages it (backward position). The right-hand lever is the gear shift lever having three positions: front — the 2.78 gear engaged, neutral — the transfer case inoperative, and rear — the 1.15 gear engaged. The low speed may be engaged only after stopping the automobile and engaging the front axle being intended for use only over extremely difficult roads.

The countershaft and the driven shaft of the transfer case are carried on tapered roller bearings. Bearing adjustment is accomplished by means of adjusting shims laid under the bearing caps.

The transfer case control system incorporates an interlock mechanism preventing the low gear to be engaged when the front axle is disengaged and the front axle to be disengaged with engaged low gear.

The care of the transfer case consists in regular lubrication, checking the attachment of the propeller shaft flanges and adjustment of shaft play.

#### PROPELLER SHAFTS

The automobile is equipped with three propeller shafts: intermediate — between the transmission and transfer case, front, and rear — between the transfer case and front and rear axles.

The propeller shafts are installed with splined ends directed towards the transfer case.

The care of the propeller shafts consists in regular lubrication of universal joints, splines, sliding yokes, cleaning the shafts from dirt and inspection of seals. If a splined connection is to be disassembled see that during reassembly the pointer marks are lined up.

#### REAR AXLE (Fig. 26)

The rear axle includes a split casing with axle shaft sleeves. The sleeves accommodate: the bevel main drive and differential with two bevel satellites and axle shaft gears. The axle shafts are inserted into the splined holes of the axle shaft gears.

The care of the rear axle consists in regular lubrication, tightening

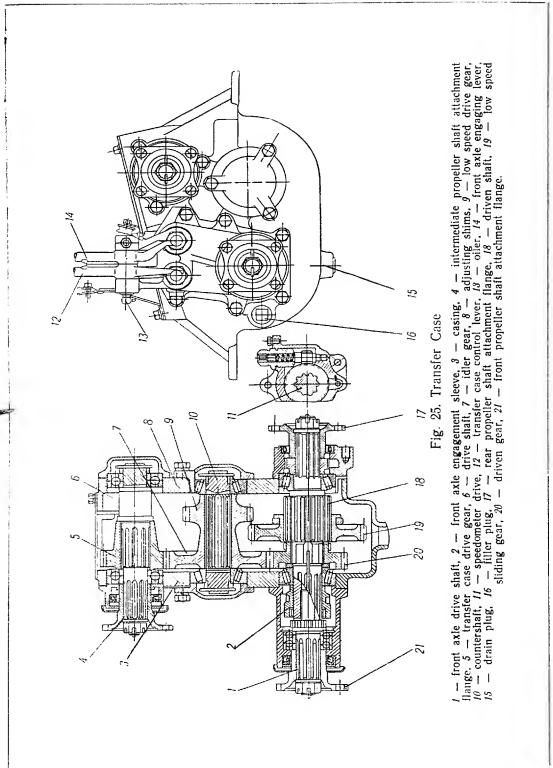


Fig. 25. Transfer Case

1 — front axle drive shaft; 2 — front axle engagement sleeve; 3 — casting; 4 — intermediate propeller shaft attachment flange; 5 — transfer case drive gear; 6 — drive shaft; 7 — idler shift; 8 — adjusting shims; 9 — low speed drive gear; 10 — countershaft; 11 — speedometer drive; 12 — transfer case control lever; 13 — oiler; 14 — oiler; 15 — drain plug; 16 — filter plug; 17 — rear propeller shaft attachment flange; 18 — rear axle engaging lever; 19 — driven shaft; 20 — front propeller shaft attachment flange.

loose attachments, adjustment of bearings and adjustment of gear mesh (when replacing or repairing the main drive).

When lubricating the rear axle, add oil to the filler plug level and clean the breather air hole.

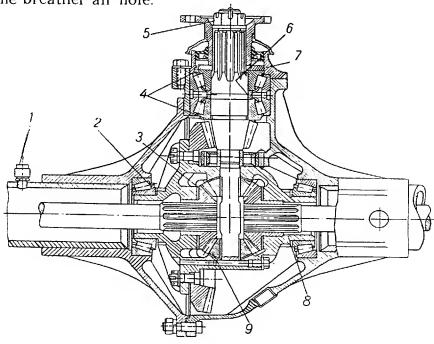


Fig. 26. Rear Axle

1 — breather; 2, 6 — differential bearing adjusting shims; 3 — axle shaft; 4 — drive gear positioning shims; 5 — tall piece bearing nut; 6 — tail piece bearing adjusting shims; 7 — oil retainer ring; 9 — sateelite thrust washer.

The tightening of the double tapered bearing of the end piece is adjusted by means of shims placed between the inner bearing races. The end piece should be free to rotate and have no axial play.

After adjustments check the bearings for heating during operation. If the bearing is heated considerably, increase the thickness of the adjusting shims.

The differential bearings are adjusted by changing the thickness of shims laid between the inner bearing races.

The adjustment of main drive bevel gear mesh is effected by changing the places of shims at outer races of the end piece bearing and at inner races of the differential bearings. The total thickness of shims in each pair of bearings should remain unchanged.

The side play of the gear teeth should be within 0.2 to 0.6 mm as measured on the drive gear end piece at a radius of 40 mm.

After adjustments check the bearings for heating in motion.

#### FRONT AXLE (Figs. 27 and 28)

The middle part of the front axle (main drive bevel gear and differential) is identical with the rear axle and is adjusted in a similar

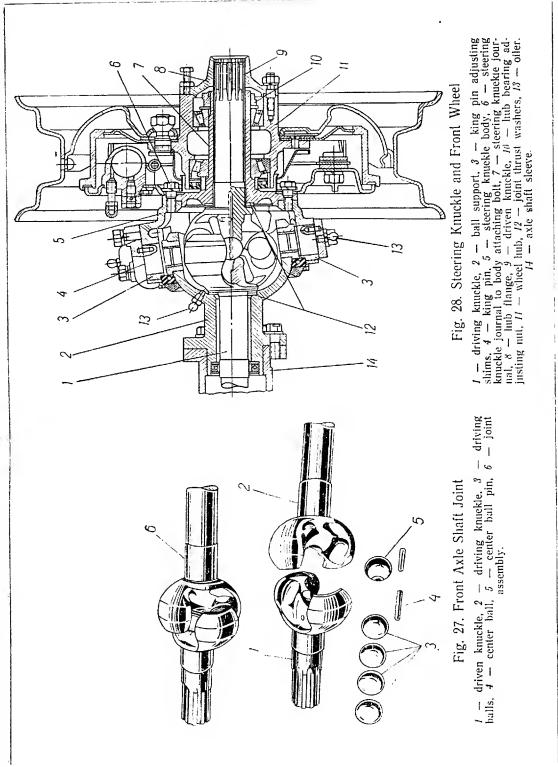


Fig. 28. Steering Knuckle and Front Wheel  
1 - driving knuckle, 2 - ball support, 3 - king pin adjusting shims, 4 - king pin, 5 - steering knuckle body, 6 - steering knuckle journal, 7 - body attaching bolt, 8 - lock nut, 9 - hub, 10 - flange, 11 - lock washer, 12 - lock pin, 13 - wheel, 14 - axle shaft sleeve

Fig. 27. Front Axle Shaft Joint  
1 - driven knuckle, 2 - driving knuckle, 3 - driving ball pin, 4 - center ball, 5 - center ball pin assembly.

manner. Since the front axle transmits tractive effort to the front wheels the outer ends of axle shafts are provided with pivots consisting of the driving and driven knuckles, a centering ball and four driving balls.

The ball support with pressed-in steering knuckle pivots is bolted to the axle shaft sleeve. The steering knuckle body is mounted on the ball support by means of two pivots. The trunnion and brake plate are attached to the steering knuckle body. Located inside the trunnion is the driven knuckle of the axle shaft connected by a flange with the wheel hub, rotating on the trunnion in two tapered bearings.

The care of the front axle is similar to the care of the rear axle. In addition, it is necessary periodically to check and adjust the play of the pivot pins and regularly lubricate the pivot pins and pivots through special grease fittings.

The pivot pin play is adjusted by means of shims. To avoid interfering with alignment, always remove the same number of shims from top and bottom.

#### WHEEL HUBS (Figs. 28 and 29)

The hubs of the front and rear wheels rotate in two tapered roller bearings which require adjustment in operation for elimination of axial play.

Adjust the wheel bearings as follows:

1. Jack up the wheel.
2. Remove the hub flange.
3. Remove the lock nut and take off the lock washer.

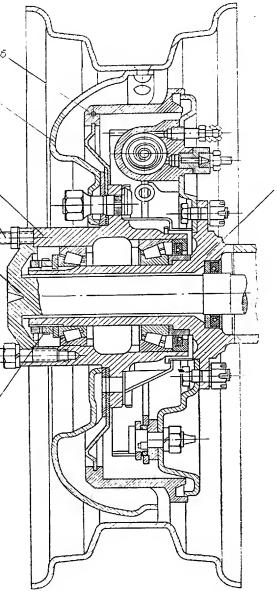


Fig. 29. Rear Wheel Hub  
1 - Bearing adjusting nut, 2 - axle shaft flange, 3 - flange removing bolt, 4 - hub, 5 - wheel disc, 6 - brake drum, 7 - axle shaft sleeve.

4. Loosen the bearing adjusting nut.
5. Check ease of wheel rotation.
6. Tighten the wheel nut sufficiently to enable the wheel to be rotated by hand though not too easily.
7. Back off the nut 2 or  $2\frac{1}{2}$  faces, replace the lock washer and lock nut.
8. Check bearing adjustment by feeling the heating of the wheel hub in motion.

#### RUNNING GEAR AND STEERING GEAR

##### STEERING GEAR (Fig. 30)

The steering gear comprises the worm mechanism and steering rods. The care of the steering gear consists in lubricating the mechanism and rod joints, checking their attachments, adjusting the steering gear for mesh and backlash.

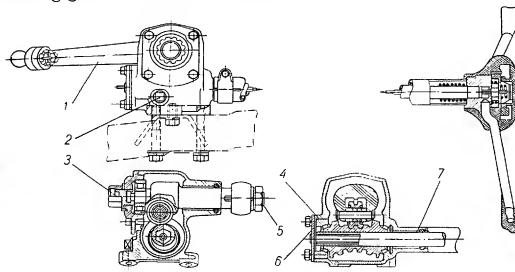


Fig. 30. Steering Gear

1 — Steering arm, 2 — filler plug, 3 — mesh clearance adjusting screw, 4 — worm bearing adjusting shims, 5 — steering arm shaft, 6 — front cover, 7 — steering shaft.

With a properly adjusted steering mechanism the steering wheel should have no backlash when the automobile is driven straight ahead. When the steering wheel is turned to any extreme position the backlash reaches  $30^\circ$ . If in the straight ahead position the backlash exceeds  $40$  mm along the steering wheel rim it is necessary to adjust clearance of the steering couple displacing axially the steering arm shaft by means of the adjusting screw located on the upper cover of the steering gear case. Before making any adjustments inspect steering case attachments and condition of joints.

Worn worm bearings are adjusted by reducing the number of shims

laid under the front cover of the steering gear case. For making adjustments the steering gear should be removed from the automobile. Tightening of bearings is checked with the removed steering arm shaft. The effort necessary for rotating the steering wheel, applied to the wheel rim should be  $0.22$  to  $0.45$  kg. In the assembled mechanism this effort should be  $0.7$  to  $1.2$  kg.

##### BRAKES (Figs. 31, 32 and 33)

The automobile is equipped with independent foot and hand brake systems. The foot or service brake has a hydraulic drive and is applied to all four wheels. The hand or parking brake is operated mechanically and is applied to the power transmission.

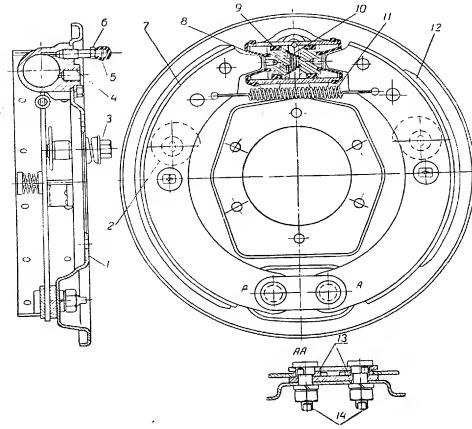


Fig. 31. Wheel Brake

1 — Brake shield, 2 — adjusting eccentric, 3 — eccentric head, 4 — wheel cylinder, 5 — cap, 6 — bleed valve, 7 — tie rod, 8 — housing, 9 — piston, 10 — spring, 11 — pull back spring, 12 — rear shoe, 13 — locating eccentric, 14 — pins.

The care of the brakes consists in adjusting the brake shoe clearance, the play of the brake pedal, the length of the hand brake cable and in regular filling the hydraulic system with brake fluid.

As the brake shoe linings become gradually worn the shoe to drum clearances are increased. With correct clearances full braking should take place during the first half of the brake pedal travel. The brakes are adjusted by means of two eccentrics whose hexahedral ends project outside.

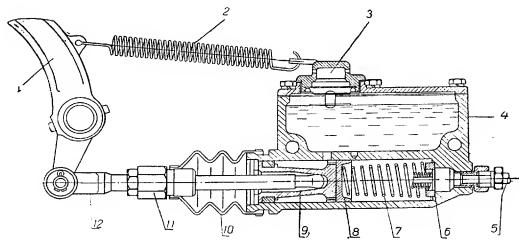


Fig. 32. Brake Master Cylinder  
 1 — brake pedal, 2 — pedal spring, 3 — filter plug, 4 — body, 5 — brake line, 6 — valves, 7 — plunger spring, 8 — collar, 9 — plunger, 10 — housing, 11 — pusher, 12 — pedal yoke.

#### To adjust the brakes:

1. Jack up the wheel.
2. Rotating the wheel turn the adjusting eccentric of the front brake shoe until the shoe brakes the wheel.
3. Loosen the eccentric gradually until the wheel is free to rotate again.
4. Adjust the rear brake shoe in the same way.
5. Adjust the brakes of the remaining wheels.
6. Check the brake drums for heating while the automobile is in motion.

Do not check brake adjustment by turning the brake shoe supporting pins. These pins have to be adjusted during replacement of brakes or linings only.

The play of the brake pedal is determined by the clearance between the pusher and the piston of the brake master cylinder. The clearance should be 1.5 to 2.5 mm which corresponds to a brake pedal play of 11 to 14 mm. The adjustment is carried out by changing the length of the pusher which is done by screwing it on the pedal fork (See Fig. 32).

The hydraulic brake system is filled with 0.4 liters of special brake fluid.

#### Fill the system as follows:

1. Remove the floor mat and the access hole cover, unscrew the filter plug of the brake master cylinder and fill it with fluid.

2. Remove the cap from the bleeder valve on the rear right wheel cylinder and slip a rubber hose 350 to 400 mm long on the valve. Dip the other end of the hose into a glass container of 1 liter capacity, half-full of brake fluid.

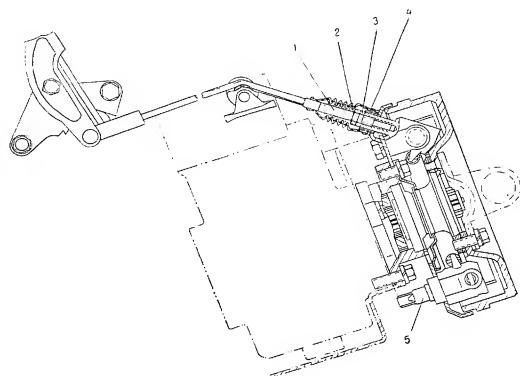


Fig. 33. Hand Brake Linkage  
 1 — cable end, 2 — lock nut, 3 — nut, 4 — brake shoe expander rod, 5 — adjusting screw.

3. Loosen the bleeder valve  $\frac{1}{8}$  or  $\frac{3}{4}$  of a turn and pump the brake a few times, depressing it sharply and slowly releasing it. This will make the fluid fill the pipes and expel air out of them. Bleed the system until the air bubbles cease to emerge from the hose dipped in the container with fluid. While bleeding the system add fluid in the brake master cylinder.

4. Screw in the wheel cylinder bleeder valve tightly and replace the cap. Turn the valve IN with depressed brake pedal.

5. The brakes should be bled in the following sequence: rear right, front right, front left and rear left.

6. After bleeding fill the brake master cylinder 15 or 20 mm below the upper edge of the hole and screw in the plug tightly.

With correct shoe to drum clearances and absence of air in the system the depressed brake pedal should go down not farther than half of its travel after which the foot should feel a resistance. If the pedal

moves lower it is an evidence of excessive clearances. If no resistance is felt it shows that the system is air-bound.

Efficient functioning of the hand brake is ensured by correct setting of the brake shoe springs. The stronger springs painted black should be installed on the right-hand side. The weaker springs painted red should be installed on the left-hand side.

The hand brake needs adjustment when the lever travel is insufficient for the full braking which is caused by excessive clearances between the brake shoes and drum or by excessive length of the brake cable.

To adjust the shoe to drum clearance turn the adjusting screw all the way IN then back it OFF 4 to 6 clicks ( $\frac{1}{4}$  or  $\frac{1}{2}$  of a turn).

To adjust the length of the brake cable move the lever handle into the third tooth space of the segment gear (counting from the rear end). Then unscrew the lock nut and nut of the cable and screw the cable end piece IN until braking begins. Lock the cable in this position.

#### SUSPENSION (Fig. 34)

The automobile suspension consists of four semi-elliptic springs and four hydraulic shock absorbers.

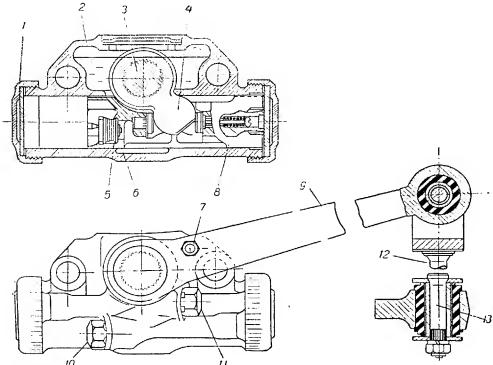


Fig. 34. Shock Absorber  
1 — Shock absorber cylinder cover; 2 — shock absorber body; 3 — shock absorber shaft; 4 — piston; 5 — inlet valve; 6, 9 — shock absorber pistons; 7 — filler plug; 8 — shock absorber lever; 10 — compression stroke valve plug; 11 — return stroke valve plug; 12 — shock absorber bracket; 13 — bracket attachment.

Placed between the springs leaves are gaskets of plywood soaked in mineral oil. The springs are enclosed in boots filled with graphite lubricant. The springs are attached by spring bolts with rubber sleeves.

Two way piston type shock absorbers are installed on all wheels.

The care of the suspension consists in regular cleaning, inspection of attachments, periodical lubrication and adding fluid to the shock absorbers.

When topping up the shock absorbers without removing them from the automobile disconnect the shock absorber bracket, and add fluid by small portions, rocking the lever.

#### TYRES

The automobile is equipped with low pressure tyres  $6.50 \times 16''$ . The care of the tyres consists in the following:

Daily, before work check tyre pressures (2 kg/sq. cm for front wheels, 2.2 kg/sq. cm for rear wheels). Check condition of tyre valves and presence of valve caps.

After work inspect the tyres, remove foreign articles from them. Keep oil and gasoline away from the tyres.

If the automobile is to stand idle for more than 10 days, the tyres should be relieved by jacking the automobile and placing it on trestles. Do not allow the automobile to stand on deflated tyres.

Removed tyres should be stored in a dry place at a maximum temperature of  $+20^\circ C$  and a relative air humidity of 50 to 80 per cent. Store the tyres in a vertical position on wooden racks and the tubes — slightly inflated on hangers with a half-rounded shelf. From time to time the tyres and tubes should be turned over.

During operation check frequently the tyre pressure. Incorrect pressure renders engagement and disengagement of the front axle difficult, causes overheating of the transfer case and results in premature wear of the tyres.

Avoid rough braking and knocking against curbs as this causes excessive wear of the tyres. During stops inspect the tyres and remove stuck nails and similar articles.

To ensure uniform wear of the tyres interchange them every 3,000 km, as shown in Fig. 35. If the tyres wear irregularly, adjust the toe-in by changing the length of the steering tie rod. The toe-in should be within 1.5 to 3.0 mm.

The tyres should be mounted as follows:

- Prior to mounting check condition and cleanliness of the wheel rim.

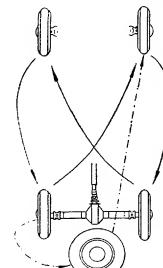


Fig. 35. Tyre Interchanging Sequence

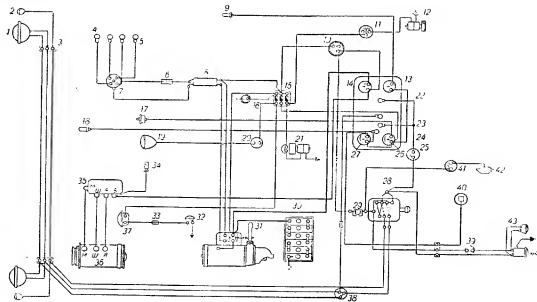


Fig. 36. Wiring Diagram

1 — head lamp, 2 — side lamp, 3 — connection panel, 4 — spark plugs, 5 — suppressor resistor, 6 — suppressor resistor, 7 — distributor, 8 — ignition coil, 9 — thermometer unit, 10 — ignition switch, 11 — fan switch, 12 — defrost ventilator, 13 — thermometer, 14 — ammeter, 15 — fuse block, 16 — socket, 17 — pressure gauge unit, 18 — tell-tale lamp unit, 19 — spotlight lamp, 20 — switch, 21 — wiperscreen wiper, 22 — stop light indicator, 23 — temperature tell-tale lamp, 24 — pressure gauge, 25 — gasoline level indicator, 26 — lighting master switch, 27 — button fuse, 28 — storage battery, 29 — current and voltage regulator, 30 — generator, 31 — horn, 32 — connecting sleeve, 33 — hood lamp, 34 — current and voltage regulator, 35 — generator, 36 — horn, 37 — stop light switch, 38 — fuel tank rheostat, 41 — switch, 42 — lighting foot switch, 43 — tall light, 44 — trailer socket.

2. Powder the tyre and tube with talc.
3. Install the tyres in accordance with the arrows pointing in the direction of rotation.
4. See that the tube valve is properly installed in the rim, without deformation. Before inserting the second tyre bead into the rim inflate the tube enough to make it unfold.
5. Put caps on tyre valves to protect valve cores from dirt.

#### ELECTRIC EQUIPMENT

The electric equipment comprises the generator with current and voltage regulator, storage battery, lighting system, starting motor and instruments.

The general wiring diagram is shown in Fig. 36.

#### GENERATOR

The generator is a shunt-wound two-brush machine driven by the fan belt. Service the generator as follows:

Every 1,000 km check the attachment of the generator and generator pulley and inspect all contact connections. Every 6,000 km do the following:

1. Inspect generator brushes, check their contact with the commutator, check brush pressure (1,250 to 1,750 g). Replace the brushes if the pressure is less than 800 g.
2. Blow out the commutators with compressed air and wipe with a cloth soaked in gasoline.
3. Should the commutator become badly worn clean it with fine emery paper.

Lubricate the generator bearings as described in the Lubrication Chart.

#### CURRENT AND VOLTAGE REGULATOR

The current and voltage regulator type PP-20 is installed under the engine hood being closed by a hermetic cap and sealed. The current and voltage regulator consists of the circuit breaker, current limiting regulator and voltage regulator (Fig. 37).

Every 6,000 km check the regulator adjustment and clean its contacts.

The circuit breaker is checked as follows (Fig. 38):

1. Disconnect the cable from the "B" terminal of the current and voltage regulator and cut in a check ammeter between this cable and the "B" terminal.

2. Cut in a check voltmeter between the "R" terminal and ground.

3. Start the engine, increase its speed and mark the voltage at which the circuit breaker contacts close (closing of contacts is determined by the deviation of the ammeter pointer). This voltage should be 12.2 to 13.2 V.

4. When decreasing engine speed determine by the ammeter the return current at which the circuit breaker contacts open. The current should be 0.5 to 6.5 A.

The current limiting regulator should be checked as follows:

1. Jack up both automobile axles. Engage the front axle.

2. Cut in a check ammeter as shown in Fig. 38.

3. Switch on the starting motor a few times in order to slightly discharge the storage battery.

4. Start the engine and smoothly engage the high gear. Depress the accelerator pedal until the speedometer reads 41 to 46 km/hr which corresponds to 1,800—2,000 r.p.m. of the engine.

5. Switch on all the current consumers on the automobile. The check ammeter should register 17 to 19 A. In 1½ or 2 min the battery will be charged and the charging current will be less than 10 A.

The voltage regulator must be checked as follows:

1. Jack up both axles and engage the front axle.
2. Cut in a check voltmeter between the "B" terminal and ground.

3. Cut in a check ammeter between the "B" terminal and black cable leading from the ammeter installed on the instrument panel.

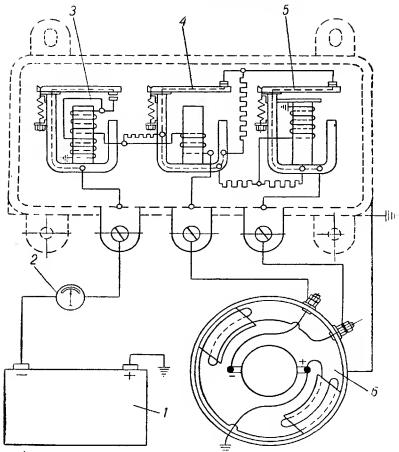


Fig. 37. Current and Voltage Regulator and Generator Hook-Up  
 1 — storage battery, 2 — ammeter, 3 — circuit breaker, 4 — current limiting regulator, 5 — voltage regulator, 6 — generator.

4. Increase engine RPM until the speedometer reads 41 to 46 km/hr. If with the fully charged battery the check voltmeter registers more than 15.5 V this is an evidence that the current and voltage regulator is out of order.

5. Disconnect the storage battery with the engine running.

6. Switch on the current consumers so that the generator load is 10 A as shown by the check ammeter. The voltage registered by the voltmeter after 10 minutes' operation should be 14.2 to 14.8 V.

After 24,000 km of operation remove the current and voltage regulator from the automobile, open it, inspect and tighten all terminals. Inspect and clean the contacts with a special abrasive plate and wipe with paper.

Check the armature to core clearances on the voltage regulator and current limiting regulator (Fig. 39). The clearance should be 1.4 to

1.5 mm with closed contacts. Check the clearance as shown in Fig. 39. To adjust the clearance loosen the screws and move the contact bracket.

Subsequent to cleaning the contacts and adjusting the clearance check functioning of the voltage regulator. To increase generator voltage increase armature spring tension by tightening the adjusting nut.

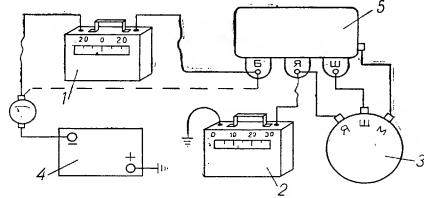


Fig. 38. Current and Voltage Regulator Checking Diagram  
 1 — ammeter, 2 — voltmeter, 3 — generator, 4 — storage battery, 5 — current and voltage regulator.

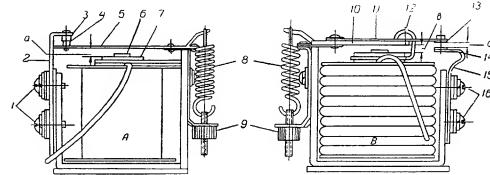


Fig. 39. Checking PPso Current and Voltage Regulator Clearances  
 A — in voltage regulator and current limiting regulator, B — in circuit breaker, 2 — contact bracket attachment screws, 4 — contact bracket, 8 — fixed contact, 10 — armature, 11 — current carrying plate, 12 — shackle, 13 — moving contact, 14 — fixed contact, 15 — contact bracket, 16 — contact, c — circuit breaker contact; a — armature to core clearance in voltage regulator and current limiting regulator; b — armature to core clearance in circuit breaker; c — circuit breaker contact clearance.

The clearances of the current limiting regulator are checked and adjusted in the same manner as in the voltage regulator. To increase current — increase spring tension.

In the circuit breaker the armature to core clearance should be 1.3 to 1.5 mm with opened contacts. The clearance between contacts should be 0.7 to 0.9 mm. Adjustment of the armature to core clea-

rance is done by bending the armature limiting shackle. The contact clearance adjustment is done by bending the contact bracket. To increase voltage at which the contacts close increase spring tension.

#### STORAGE BATTERY

The automobile is equipped with the 6CT-54 storage battery, 12 V, 54 A-h at 10 hour discharging rate. The specific gravity of the electrolyte in the fully charged battery in temperate climate should be 1.285 in winter and 1.270 in summer. At a temperature below  $-35^{\circ}\text{C}$  the specific gravity should be increased up to 1.310. In the south regions in summer bring the specific gravity down to 1.240.

Avoid discharging the battery in excess of 50 per cent in summer and 25 per cent in winter. The electrolyte specific gravity in relation to the degree of battery charging is given in the Table. The specific gravity should be tested by a special hydrometer taking into account temperature corrections.

#### SPECIFIC GRAVITY OF ELECTROLYTE AT $15^{\circ}\text{C}$

Full charge	25 % discharge	50 % discharge
1.310	1.270	1.230
1.285	1.245	1.205
1.270	1.230	1.190
1.240	1.200	1.160

It should be noted that in cold weather the storage battery capacity is reduced by 1 or 2 per cent with each degree of temperature reduction. As a rule the electrolyte level in the battery should be 10 to 15 mm above the screen protecting cell plates. The level is checked by means of a glass tube with an inside diameter of 3 to 5 mm. Insert the tube into the filler opening until it touches on the screen, close the top hole in with the thumb and remove the tube. The height of the electrolyte in the tube corresponds to the height of the electrolyte above the screen. Add distilled water if necessary.

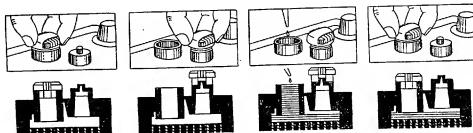


Fig. 40. Sequence of Storage Battery Refilling Operations

Add water in the sequence shown in Fig. 40. Unscrew the filler plug and slip it tightly over the ventilation hole tapered tip located near the filler hole. Add water almost up to the rim of the filler hole. Remove the plug from the ventilation hole and slip it in the filler hole. The electrolyte level will then drop to normal height.

To check the storage battery and determine the state of its charge — check the specific gravity of the electrolyte. In addition, every month check each cell with a resistance fork. When checking the battery with a resistance fork fitted with a resistor corresponding to 150 A the voltage of each cell of a charged battery should be not less than 1.5 V at least during 5 sec.

The care of the battery consists in regular inspections, cleaning, charging and maintaining proper level and specific gravity of the electrolyte.

#### Daily servicing:

1. Clean the battery from dirt. Wipe off spilled electrolyte. Clean corroded terminals and cable ends and coat them with vaseline.
  2. Check condition of battery attachments.
  3. See that the cable terminals are tight.
  4. Clear battery air vents.
- After 1,000 km but not rarer than every 10—15 days in winter and 5—6 days in summer, do the following:
1. See that the electrolyte level is at the proper height. Add distilled water, if necessary.
  2. Check the specific gravity of the battery solution for state of charge.
  3. See that the terminals are tight and the battery case is in good condition.

#### HEAD LAMPS

The head lamps are equipped with a semi-sealed optical unit incorporating a steel reflector, lens, and a two-filament bulb with socket and cap. The lower 50 c.p. filament located in the reflector focus is used for the country light; the upper 21 c.p. filament is for traffic light.

The lens is held in place by bent reflector tongues. To replace a broken lens:

1. Unbend the reflector tongues, remove the damaged lens and rubber gasket.
  2. Straighten up the reflector tongues and put in place the rubber gasket.
  3. Install a new lens and bend the tongues.
- To adjust the head lamp beams:
1. Place the unloaded vehicle on a level floor, squarely facing an adjusting screen 7.5 m from the head lamps and remove head lamp rims.
  2. Turn the light on and see that the connections are correct and both head lamps flash on simultaneously.

3. Turn on the country light, cover one head lamp and adjust the other one by means of adjusting screws so that the hot spot on the screen is at a height of 725 mm from ground and 490 mm from the automobile center line.

4. Repeat the adjustment for the other lamp so as to position the upper limits of both hot spots on the same height.

The spotlight lamp installed to the left of the windscreen serves for additional lighting of the road. The switch for this lamp is located under the light socket to the left of, and below, the instrument panel.

The spotlight lamp can be turned by the driver's hand through an opening in the canopy side flap.

#### STARTING MOTOR (Fig. 41)

The four-pole, four-brush type CT20 starting motor with series excitation is used. The starter pinion is engaged automatically by the overrunning clutch.

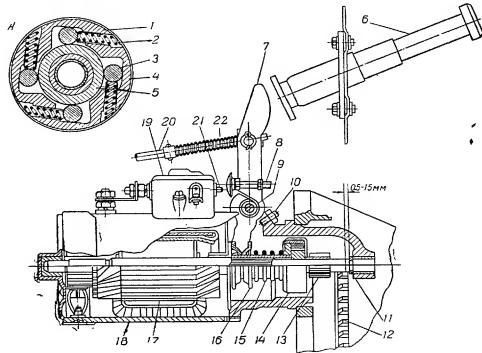


Fig. 41. Starting Motor and Engagement Mechanism

1 — outer case, 2 — spring, 3 — roller, 4 — sleeve body, 5 — inner case, 6 — pedal, 7 — engagement lever, 8 — adjusting rod, 9 — spring, 10 — adjusting screw, 11 — thrust washer, 12 — flywheel ring gear, 13 — starting motor, 14 — flywheel, 15 — overrunning clutch, 16 — sleeve, 17 — spring, 18 — starting motor armature, 19 — starting motor body, 20 — switch, 21 — rod leading to coarse filter, 22 — rod, 22 — spring, 23 — overrunning clutch.

The drive clutch should be adjusted with the starting motor removed from the engine.

1. The clearance between the starter pinion and thrust washer in the extreme engaged position should be from 0.5 to 1.5 mm. The clearance may be adjusted by the special adjusting screw.

2. The contacts of the electric starter switch should start to close when the starter pinion has moved away from the thrust washer no more than 4 mm which is ensured by turning the adjusting rod OUT. After the contacts of the starter switch have closed the drive rod of the coarse oil filter should have an additional 1mm travel.

3. The contacts cutting in the additional resistor of the ignition coil should close either simultaneously with the electric starter switch or somewhat earlier.

The care of the starting motor consists in checking its connections and cables every 1,000 km. After 12,000 km the starting motor should be removed and blown out with compressed air. Inspect condition of the commutator and brushes. Brush spring tension should be 850 to 1,400 g.

#### Care of the instruments:

1. When removing the remote water thermometer and oil pressure gauge units as well as the gasoline level gauge rheostat insulate the cable ends to avoid short-circuiting. When installing the oil pressure gauge unit see that the "Bepx" (Top) mark is facing upwards.

2. See that the cooling water level does not drop too low as this may cause damage to the water temperature gauge unit due to overheating.

3. Once a year check the readings of the water temperature gauge by removing the unit and dipping it into hot water whose temperature is measured by a reference thermometer.

4. Once a year check the readings of the oil pressure gauge by means of a reference pressure gauge.

#### SPEEDOMETER AND FLEXIBLE SHAFT

The speedometer drive shaft is lubricated by a wick soaked with vaseline oil and placed in the hole in the speedometer tail piece. The hole is covered with a stamped brass plug. Every 25,000 km remove the speedometer, take out the plug and soak the wick with vaseline oil.

Every 25,000 km or earlier if the automobile is operated in hot climate, add vaseline oil to the flexible shaft sheath. In winter vaseline oil should be replaced by spindle oil. Pack lubricant into the sheath by an ordinary grease gun.

#### BODY

The FA3-69 automobile is equipped with an all-metal open type two-door body with folding tailboard and removable canopy. The front seats are cushioned with collapsible backrests. Threeman seats located along the boards have semi-cushioned seats and backrests.

For transportation of goods the side seats are raised and secured by straps.

The automobile is equipped with a canvas canopy fixed on a dismountable metal frame. The doors are covered with removable side flaps. The frame, canopy and side flaps are stored inside the body so as not to block useful space: the two frame bows are so placed as to form side rails; the bow connecting members are secured under the side seats, the folded canopy is stored under the driver's seat and the side flaps are placed between the double walls of the tailboard.

Tool boxes are situated under the rear seats. The starting heater torch is secured in the left front tool box. The reserve oil can is located in the right front tool box. The rear boxes are empty.

The FA3-69A automobile is equipped with an all-metal, open type, four-door body. The rear part of the body is provided with a luggage compartment.

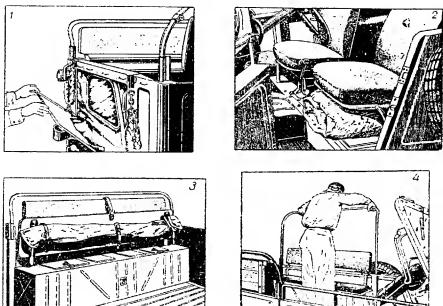


Fig. 42. Folding FA3-69 Automobile Canopy  
1 — placing side flaps between double walls of tail board, 2 — placing folded canopy under front left seat, 3 — placing bows into rails, 4 — conversion of bows into rails.

The canvas canopy is fixed on a dismountable frame. Both the canopy and frame are stored in the luggage compartment behind the rear seat. To fold the canopy remove two bolts attaching the canopy to the windscreen then disengage the two frame posts by depressing the dowel (Fig. 43) after which the canopy can be folded back, the mechanism is also folded and the canopy is placed on top of it. The

folded canopy is secured by straps. The canopy mechanism is attached to the rear bows by side straps. The door flaps are stored in a special bag in the luggage compartment.

**Body lubrication.** Every 6,000 km lubricate door hinges, hood hinges, door locks and limiter hinge by a 60 per cent solution of colloid graphite in white spirit or by engine oil.

The door dovetail female locks, door dovetail male and door lock bolt should be lubricated every 6,000 km either by a compound consisting of 30 per cent of natural wax, 60 per cent paraffine and 10 per cent graphite, or by a thin coating of grease.

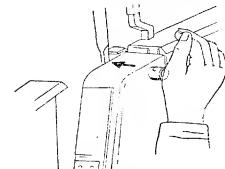


Fig. 43. Removal of Canopy Frame post

#### HEATING AND VENTILATION

The automobile is heated by hot water from the engine cooling system (Fig. 44). The water enters the special heater radiator mounted behind the instrument panel. The heater heats the air which is then forced into the body through a port located in front of the windscreen. The air is forced in by the oncoming air flow.

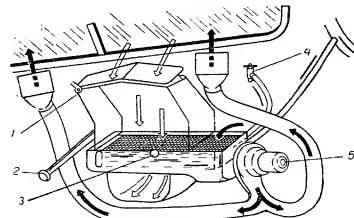


Fig. 44. Body Heating and Ventilation Diagram  
1 — heater port, 2 — port handle, 3 — windscreen defroster ventilator motor switch, 4 — cock for control of delivery of hot water from cylinder head to heater radiator, 5 — windscreen defroster ventilator motor.

Temperature control inside the body is effected by opening the heater port and the water shut-off cock located on the engine cylinder head. Windscreen defrosting is ensured by warm air supplied by the electric ventilator. The ventilator motor switch has three positions: middle — off, left — low speed, right — high speed.

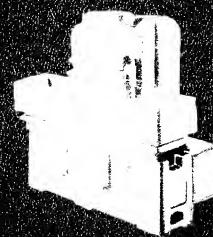
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CABLES:  
**STANKOIMPORT MOSCOW**

# **GRINDING MACHINES**



VSESOJUZNOE EXPORTNO-IMPORTNOE OBJEDINENIE  
**STANKOIMPORT**  
U.S.S.R. MOSCOW

# GRINDING MACHINES

CYLINDRICAL GRINDING MACHINES  
UNIVERSAL GRINDING MACHINES  
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INTERNAL GRINDING MACHINES  
ROLL GRINDING MACHINES  
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LAPPING MACHINES  
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VSESOJUZNOJE EXPORTNO-IMPORTNOJE OBJEDINENIJE

**STANKOIMPORT**

U S S R

MOSCOW

This catalogue contains short specifications of the most common types of machine tools exported by the Vsesojuznoje Exportno-Importnoje Objedinenie "Stankoiport".

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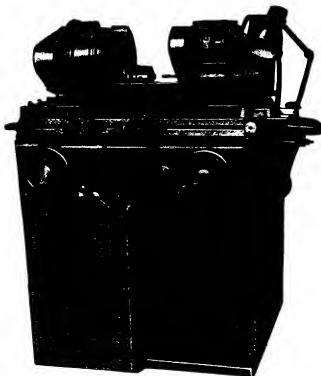
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Steady improvement of machine tool design in the USSR aims at the increase of productivity, accuracy, reliability and dependability of machine in operation, as well as the reduction of operator's fatigue by improving and convenient placing of all operating controls and the all-increasing automatization of operation.

The Vsesojuznoje Exportno-Importnoje Objedinjenije "Stankos-import" is able to offer wide range of Machine Tools both universal and special types including Automatic Transfer Machines and Automatic Workshops.

HYDRAULIC  
UNIVERSAL GRINDING MACHINE  
MODEL 3110



The 3110 Hydraulic Universal Grinder is designed for both external and internal cylindrical and taper grinding as well as for face grinding of parts held either between centers or in chucks.

The headstock and wheel head are of the swiveling type. The headstock spindle is driven by a two-speed electric motor through a Vee-belt drive.

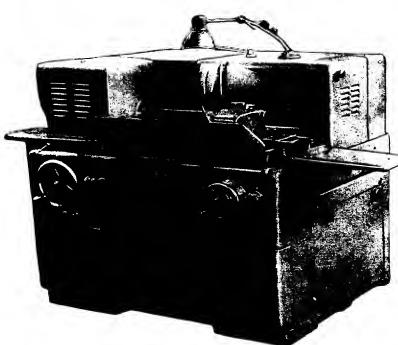
The table traverse is hydraulically operated.

СТАНКОИМПОРТ

**SPECIFICATIONS**

<b>Capacity</b>	<b>Speeds</b>	
Height of centers, mm . . . . .	70	Grinding wheel speed, r.p.m. . . . .
Distance between centers, mm . . . . .	200	Internal grinding wheel speed, r.p.m. . . . .
Maximum hole, mm . . . . .	130	15000
Recommended diameter of grinding, mm . . . . .		
Minimum . . . . .	3	
Maximum . . . . .	25	220/300 volt, 3 phase, 50 cycle
Maximum grinding length, mm . . . . .	200	A.C. motors:
Diameter of hole ground, mm: . . . . .		Headstock (two-speed motor):
Minimum . . . . .	6	Power, kW . . . . .
Maximum . . . . .	25	0.35/0.225
Maximum length of hole ground, mm . . . . .	50	Speed, r.p.m. . . . .
Minimum . . . . .		3000/1500
Maximum . . . . .		
Wheel head . . . . .		
Power, kW . . . . .		1
Speed, r.p.m. . . . .		3000
Hydraulic pump: . . . . .		
Power, kW . . . . .		0.6
Speed, r.p.m. . . . .		1500
Coolant pump: . . . . .		
Power, kW . . . . .		0.125
Speed, r.p.m. . . . .		3000
<b>Table</b>		
Maximum table traverse, mm . . . . .		
Swivel range of table . . . . .	+ 5°; - 7°	
<b>Wheel Head</b>		
Maximum cross travel of wheel head . . . . .	100	
Maximum length of wheel head rapid withdrawal, mm . . . . .	15	
Maximum swivel of wheel head . . . . .	180°	
Diameter of grinding wheel, mm: . . . . .		
Minimum . . . . .	140	
Maximum . . . . .	200	
		Net weight, kg . . . . . approx. 850

**PRECISION  
CYLINDRICAL GRINDING MACHINE**  
MODEL 3153 M



The 3153 M Precision Cylindrical Grinder is designed for external cylindrical grinding.

The work is driven by a two-speed A.C. motor.

The wheel head is mounted on roll ways.

The machine provides for high precision grinding, and it can be operated in a seated position.

All the main and most of the auxiliary motions of the machine are operated automatically.

Table and wheel head traverses are operated hydraulically.

**СТАНКОИМПОРТ**

**СТАНКОИМПОРТ**

**SPECIFICATIONS****Capacity**

Height of centers over table, mm . . . . .  
 Distance between centers, mm . . . . .  
 Maximum swing, mm . . . . .  
 Recommended diameter of grinding, mm:  
 Minimum . . . . .  
 Maximum . . . . .

	<b>Speeds</b>
70	Grinding wheel speeds, r.p.m. 1800; 2200
500	Work speeds, r.p.m. . . . 150; 250; 300;
130	400; 500; 800 Range of table traverse speeds (hydraulic), mm/min. . . . . 0.2—6

**Drive**

Table	Power of electric motors, kW	4.4
-------	------------------------------	-----

**Table**

Maximum table longitudinal traverse, mm . . . . .

590	Power of electric motors, kW	4.4
-----	------------------------------	-----

**Wheel Head**

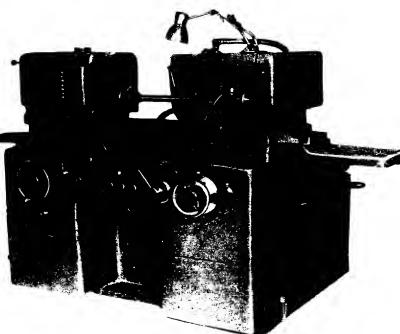
Maximum cross travel of wheel head, mm . . . . .  
 Wheel head automatic cross travel, mm per stroke of table:  
 Minimum . . . . . 0.0025  
 Maximum . . . . . 0.025

130	Space Occupied
	Floor space, mm . . . . . 2000 × 1260
	Height of machine, mm . . . . . 1250

**Weight**

Maximum grinding wheel dimensions, mm . . . . . 400 × 40 × 127 Net weight, kg . . . . . approx. 2100

**HYDRAULIC  
UNIVERSAL GRINDING MACHINE**  
**MODEL 312 M**



The 312 M Universal Grinder is a high precision machine designed for both center- and chuck-type grinding operations.

The proportions of swing and length together with the swiveling headstock and wheel head enable this machine to grind all kinds of precision tool room work, as well as many small parts, on a production basis. This includes straight grinding, shoulder grinding, taper grinding, face grinding and internal grinding. The wheel head is fully universal and may be swiveled for grinding tapers longer than the width of the wheel. The machine is arranged for both hand and automatic feed to the wheel head at each table reversal.

The table is in two sections, the traversing carriage and the upper portion on which the headstock and footstock are mounted.

The top table can be swiveled for taper grinding. The carriage traverses either by hand or by hydraulic power. The hydraulic traverse gives smooth,

**СТАНКОИМПОРТ**

**СТАНКОИМПОРТ**

uniform speed to the carriage in either direction at any speed in the range of 0.2 to 6 m/min. and can be adjusted exactly to the requirements of the work. The stroke and reversal of the table are controlled by adjustable dogs.

Power for the headstock drive is obtained from a 0.65 kW two-speed motor. The headstock unit may be swiveled for grinding tapered holes.

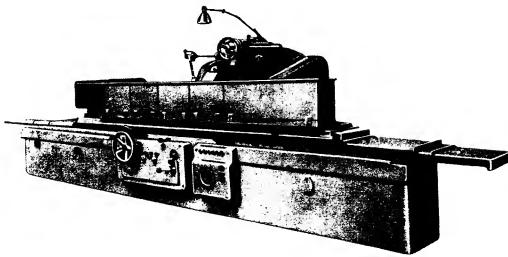
#### SPECIFICATIONS

Capacity	
Height of centers, mm . . . . .	110
Distance between centers, mm . . . . .	500
Maximum swing over table, mm . . . . .	200
Diameter that can be ground, mm:	
Minimum . . . . .	7
Maximum . . . . .	40
Diameter of hole ground, mm:	
Minimum . . . . .	25
Maximum . . . . .	50
Maximum length of hole ground, mm . . . . .	75
Table	
Maximum traverse of table, mm . . . . .	590
Wheel Head	
Maximum cross travel of wheel head, mm . . . . .	215
Wheel head swivel . . . . .	± 180
Cross slide swivel . . . . .	± 90
Speeds	
Speed of grinding wheel spindle, r.p.m. . . . .	2500
Speeds of internal grinding wheel spindle, r.p.m. . . . .	8000 and 17000
Work speeds, r.p.m. . . . .	
	150; 250; 300; 400; 500; 800
Table traverse speeds (hydraulic), m/min . . . . .	
	0.2 Maximum . . . . .
Drive	
	220/380 volt, 3 phase, 50 cycle A.C. motors:
	Wheel head: Power, kW . . . . .
	Speed, r.p.m. . . . .
	Hydraulic pump: Power, kW . . . . .
	Speed, r.p.m. . . . .
	Cylindrical pump: Power, kW . . . . .
	Speed, r.p.m. . . . .
Space Occupied	
	Floor space, mm . . . . .
	2000      1365
	Height of machine, mm . . . . .
	1365
Weight	
	Net weight, kg . . . . .
	approx. 2300



## HYDRAULIC UNIVERSAL GRINDING MACHINE

MODEL 3141



The 3141 Hydraulic Universal Grinder is designed for the accurate and rapid performance of a large variety of grinding operations.

The proportions of swing and length together with full universal features of headstock and wheel head enable this machine to grind all kinds of precision tool room work, as well as many other parts, on a production basis. This includes straight grinding, shoulder grinding, taper grinding, face grinding and internal grinding.

The headstock unit has a type of drive and speed change mechanism offering instantaneous changes of an infinite number of speeds ranging from 60 to 500 r.p.m. The headstock is fully universal and when swiveled as much as 90° enables face grinding of work with diameters larger than double height of centers.

The work is driven either by face plate driver or by chuck mounted on the headstock spindle. For internal grinding, chucks may be applied with or without work rests.

The wheel head is fully universal and may be swiveled for grinding tapers longer than the width of the wheel. The machine is arranged for both hand and hydraulic automatic feed to the wheel head at each table reversal.

СТАНКОИМПОРТ

СТАНКОИМПОРТ

The table is in two sections, the traversing carriage and the upper portion, on which the headstock, footstock and work rests are mounted.

The top table can be swiveled for taper grinding. The carriage traverses either by hand or by hydraulic power. The hydraulic traverse gives smooth, uniform speed to the carriage in either direction at any speed in the range of 0.08 to 8 m/min. and can be adjusted exactly to the requirements of the work.

The stroke and reversal of the table are controlled by adjustable dogs.

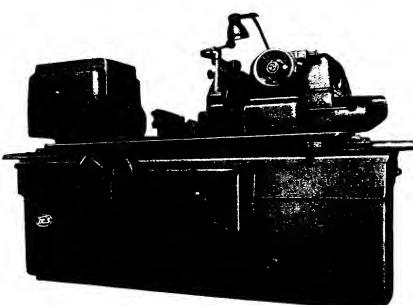
#### SPECIFICATIONS

Capacity		Without removing main grinding wheel	200
Maximum swing over table, mm	400	Diameter of hole that can be ground, mm:	
Distance between centers, mm	2000	Minimum	27
Height of centers, mm	220	Maximum	300
Distance between wheel and work centers, mm:			
Minimum	175		
Maximum	370		
Diameter that can be ground, mm:			
Minimum with wheel 340 mm diameter	10	Range of work spindle speeds (indefinitely variable), r.p.m.	60—500
Maximum with work rest	130	Speed of internal grinding wire spindle, r.p.m.	8400
Maximum without work rest and wheel 600 mm diameter	440	Table traverse speeds (hydraulic), m/min.:	
		Minimum	0.08
		Maximum	8
	Spindle		
Table, Headstock and Footstock		220 380 volt, 3 phase, 50 cycle	
Maximum traverse of table, mm	2060	A.C. motors:	
Swivel range of table	+10°; -2°	Wheel head:	
Taper hole in headstock spindle	Morse No. 5	Power, kW	10
Taper hole in footstock spindle	Morse No. 4	Speed, r.p.m.	1500
Headstock swivel	360°	Internal grinding attachment:	
Wheel Head		Power, kW	1
Maximum cross travel of wheel head, mm	385	Speed, r.p.m.	3000
Grinding wheel dimensions (diameter × face × hole), mm:		Hydraulic pump:	
Cross slide swiveled	400 × 50 × 207	Power, kW	2.8
General use	600 × 63 × 305	Speed, r.p.m.	1500
Wheel head swivel (wheel 400 mm diameter)	360°	Coolant pump:	
Cross slide swivel	360°	Power, kW	0.125
Internal Grinding Attachment		Speed, r.p.m.	3000
Spindle dimensions, mm	80 × 400	Headstock driven:	
Maximum length of hole that can be ground, mm:		A.C. motor:	
Main grinding wheel removed	300	Power, kW	1.7
		Speed, r.p.m.	3000
		D.C. generator:	
		Power, kW	0.47—0.69
		D.C. motor:	
		Power, kW	0.25—0.5
		Speeds, r.p.m.	350—3000
	Space Occupied		
		Floor space, mm	6540 × 2250
		Height of machine, mm	1650
	Weight		
		Net weight, kg	approx. 6000



## HYDRAULIC CYLINDRICAL GRINDING MACHINE

MODEL 3151



The 3151 Hydraulic Cylindrical Grinder is designed for precision center-type grinding operations. The machine meets in every detail all the requirements of plain cylindrical and taper grinding in large or small lots of work, with assured accuracy and fine finish. The work is set on dead centers and is driven by a driving dog fixed in the headstock face plate. The headstock spindle is driven by a constant speed motor mounted on the headstock. Three work speeds are available.

The grinding wheel head is supported by large, well spaced guides. The rapid advance of wheel slide to the work, the cross feed at each table reversal and the rapid back movement of the wheel to its starting position are operated hydraulically. Manual cross feed of wheel is also provided.

The table is in two sections, the traversing carriage and the upper portion, on which the headstock, footstock and work rests are mounted. The top table is pivoted at its center and can be swiveled for taper grinding. The traverse of the table is automatic with hand motion for positioning purposes.

СТАНКОИМПОРТ

СТАНКОИМПОРТ

Power table traverse, hydraulically operated, provides an infinitely variable range of table speeds and can be adjusted exactly to the requirements of the work.

The stroke and reversal of the table are controlled by adjustable dogs.

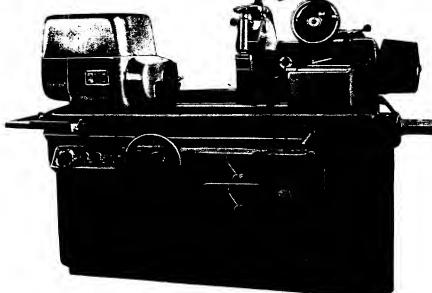
The machine enables grinding up to a positive stop and provides means for compensating for wheel wear.

#### SPECIFICATIONS

Capacity		Graduation of cross feed dial, mm	0.005
Maximum swing over table, mm	200	Grinding wheel dimensions, mm:	
Distance between centers, mm	750	Minimum diameter . . .	450
Height of centers, mm . . .	110	Maximum diameter . . .	600
Distance between wheel and work centers (without hydraulic back movement of wheel), mm:		Face . . . . .	63
Minimum . . . . .		Hole diameter . . . . .	305
Maximum . . . . .			
Diameter that can be ground, mm:			
Minimum with wheel 440 mm diameter . . .	10	Work speeds, r.p.m., . . . . .	75: 150: 300
Maximum with work rest . . . . .	60	Table traverse speeds (hydraulically), r.p.m.:	
Minimum without work rest and wheel 600 mm diameter . . . . .	200	Minimum . . . . .	0.10
		Maximum . . . . .	10
		Speeds	
	230	Work speeds, r.p.m., . . . . .	75: 150: 300
	400	Table traverse speeds (hydraulically), r.p.m.:	
		Minimum . . . . .	0.10
		Maximum . . . . .	10
		Drive	
	220 380 volt, 3 phase, 50 cycle		
	A.C. motors:		
	Wheel head:		
	Power, kW . . . . .	7	
	Speed, r.p.m. . . . .	1500	
	Headstock:		
	Power, kW . . . . .	1	
	Speed, r.p.m. . . . .	1000	
	Hydraulic pump:		
	Power, kW . . . . .	1.7	
	Speed, r.p.m. . . . .	1500	
	Coolant pump:		
	Power, kW . . . . .	0.125	
	Speed, r.p.m. . . . .	3000	
		Space Occupied	
		Floor space, mm . . . . .	3100 × 1800
		Height of machine, mm . . . . .	1475
		Weight	
Table, Headstock and Footstock			
Maximum traverse of table (hydraulic or by hand), mm	780	Net weight, kg . . . . .	approx. 3200
Maximum swivel of table, degrees . . . . .	6		
Taper hole in headstock and footstock spindles . . . . .	Morse No. 4		
Wheel Head			
Maximum cross travel of wheel head, mm:			
Manual . . . . .	200		
Hydraulic (advance) . . . . .	50		

## CYLINDRICAL PLUNGE-CUT GRINDING MACHINE

MODEL 3152



The 3152 Cylindrical Plunge-Cut Grinder is designed for center-type grinding operations. The machine meets all the requirements of external cylindrical and taper grinding in large or small lots of work, with assured accuracy and fine finish.

The work is set on dead centres and is driven by a driving dog fixed in the headstock face plate.

The headstock spindle is driven by a constant speed motor mounted on the headstock. Three work speeds are available.

The rapid advance of wheel to the work, the slow cross feed of wheel (plunge-cut grinding) and the rapid back movement of the wheel to its starting position are operated hydraulically. Manual cross feed of wheel is also provided.

The machine enables grinding with automatic retraction of wheel after the final size of work (according to 3rd class of accuracy) is reached.

СТАНКОИМПОРТ

СТАНКОИМПОРТ

The machine also enables manual grinding up to a positive stop and provides means for compensating for wheel wear. The table can be swiveled for taper grinding. The traverse of the table is operated hydraulically. The machine can be used for both plunge-cut and traverse grinding.

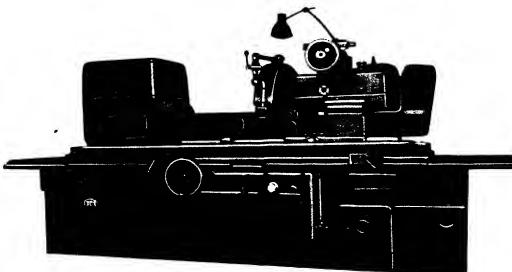


#### SPECIFICATIONS

<b>Capacity</b>	
Maximum swing over table, mm	200
Distance between centers, mm	500
Height of centers, mm	110
Distance between wheel and work centers (without hydraulic back movement of wheel), mm:	
Minimum . . . . .	230
Maximum . . . . .	400
Diameter that can be ground, mm:	
Minimum with wheel 450 mm diameter . . . . .	10
Maximum with work rest . . . . .	60
Maximum without work rest with wheel 600 mm diameter . . . . .	200
<b>Table, Headstock and Footstock</b>	
Maximum traverse of table, mm	560
Maximum swivel of table . . . . .	± 6
Taper hole in headstock and footstock spindles . . . . . Morse No. 4	
<b>Wheel Head</b>	
Maximum cross travel of wheel head, mm:	
Manual . . . . .	200
Hydraulic (advance) . . . . .	50
Graduation of cross feed dial, mm	
Grinding wheel dimensions, mm:	
Minimum . . . . .	
<b>Space Occupied</b>	
Floor space, mm . . . . .	2650 × 2020
Height of machine, mm . . . . .	1475
<b>Weight</b>	
Net weight, kg . . . . .	approx. 3000

#### HYDRAULIC CYLINDRICAL GRINDING MACHINE

MODEL 3160



The 3160 Hydraulic Cylindrical Grinder is designed for precision center-type grinding operations. The machine meets in every detail all the requirements of plain, cylindrical and taper grinding in large or small lots of work, with assured accuracy and fine finish.

The work is set on dead centers and is driven by a driving dog fixed in the headstock face plate. The headstock spindle is driven by a constant speed motor mounted on the headstock. Three work speeds are available.

The grinding wheel head is supported by large, well spaced guides. The rapid advance of wheel slide to the work, the cross feed at each table reversal and the rapid back movement of the wheel to its starting position are operated hydraulically. Manual cross feed of wheel is also provided.

The table is in two sections, the traversing carriage and the upper portion, on which the headstock, footstock and work rests are mounted. The top table is pivoted at its center and can be swiveled for taper grinding. Power table

СТАНКОИМПОРТ

СТАНКОИМПОРТ

traverse, hydraulically operated, provides an infinitely variable range of table speeds and can be adjusted exactly to the requirements of the work.

The stroke and reversal of the table are controlled by adjustable dogs.

The machine enables grinding up to a stop and provides means for compensating for wheel wear.

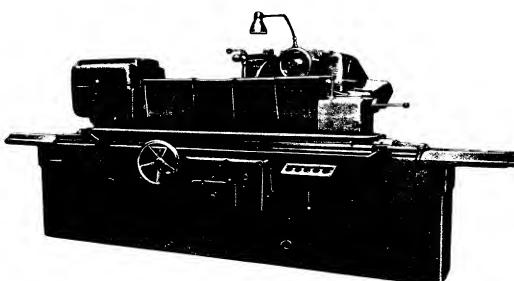
#### SPECIFICATIONS

Capacity		Graduation of cross feed dial, mm	0.005
Maximum swing over table, mm	300	Grinding wheel dimensions, mm:	
Distance between centers, mm	1000	Diameter . . . . .	500
Height of centers, mm	160	Minimum diameter . . . . .	500
Distance between wheel and work centers (without hydraulic back movement of wheel), mm:		Maximum diameter . . . . .	750
Minimum . . . . .	250	Face . . . . .	75
Maximum . . . . .	500	Hole diameter . . . . .	305
Diameter that can be ground, mm:		Work speeds, r.p.m., . . . . .	60; 120; 240
Minimum with wheel 490 mm diameter . . . . .	250	Table traverse speeds (hydraulic), m/min.:	
Maximum with work rest . . . . .	500	Minimum . . . . .	0.1
Maximum without work rest and wheel 750 mm diameter . . . . .	10	Maximum . . . . .	10
Table, Headstock and Footstock		Drive	
Maximum traverse of table, mm . . . . .	1050	220/380 volt, 3 phase, 50 cycle	
Maximum swivel of table, degrees . . . . .	7	A.C. motors:	
Taper hole in headstock and footstock spindles . . . . .	Morse No. 5	Work . . . . .	
		Power, kW . . . . .	10
		Speed, r.p.m. . . . .	1000
		Headstock:	
		Power, kW . . . . .	1.0
		Speed, r.p.m. . . . .	1000
		Hydraulic pump:	
		Power, kW . . . . .	2.8
		Speed, r.p.m. . . . .	1500
		Coolant pump:	
		Power, kW . . . . .	0.125
		Speed, r.p.m. . . . .	3000
		Space Occupied	
Wheel Head		Floor space, mm . . . . .	4320 × 2250
Maximum cross travel of wheel head, mm:		Height of machine, mm . . . . .	1500
Manual . . . . .	250	Weight	
Hydraulic (advance) . . . . .	50	Net weight, kg . . . . .	approx. 6000



## HYDRAULIC CYLINDRICAL GRINDING MACHINE

MODEL 3161



The 3161 Hydraulic Cylindrical Grinder is designed for precision center-type grinding operations. The machine meets in every detail all the requirements of plain cylindrical and taper grinding in large or small lots of work, with assured accuracy and fine finish.

The work is set on dead centers and is driven by a driving dog fixed in the headstock face plate. The headstock spindle is driven by a constant speed motor mounted on the headstock. Three work speeds are available.

The grinding wheel head is supported by large, well spaced guides. The rapid advance of wheel slide to the work, the cross feed at each table reversal and the rapid back movement of the wheel to its starting position are operated hydraulically. Manual cross feed of wheel is also provided. The table is in two sections, the traversing carriage and the upper portion, on which the headstock, footstock and work rests are mounted. The top table is pivoted at its center and can be swiveled for taper grinding. The traverse of the table is automatic with hand motion for positioning purposes.

СТАНКОИМПОРТ

СТАНКОИМПОРТ

Power table traverse, hydraulically operated, provides an infinitely variable range of table speeds and can be adjusted exactly the requirements of the work.

The stroke and reversal of the table are controlled by adjustable dogs.

The machine enables grinding up to a positive stop and provides means for compensating for wheel wear.

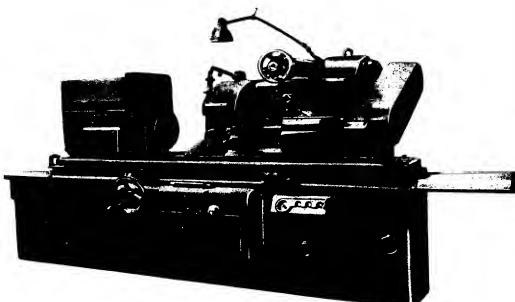
#### SPECIFICATIONS

<b>Capacity</b>		Graduation of cross feed dial, mm/min. . . . .		0.005
Maximum swing over table, mm	300	Grinding wheel dimensions, mm:		
Distance between centers, mm	1000	Minimum diameter . . . . .	450	
Height of centers, mm	135	Maximum diameter . . . . .	600	
Distance between wheel and work centers (without hydraulic back movement of wheel), mm:		Face . . . . .	63	
Minimum . . . . .	230	Hole diameter . . . . .	355	
Maximum . . . . .	450			
Diameter that can be ground, mm:				
Minimum with wheel 450 mm diameter . . . . .	10	<b>Speeds</b>		
Maximum with work rest . . . . .	60	Work speeds, r.p.m., . . . . .	75; 150; 300	
Maximum without work rest and wheel 600 mm diameter . . . . .	300	Table traverse speeds (hydraulic), m/min.:		
		Minimum . . . . .	0.1	
		Maximum . . . . .	10	
<b>Drive</b>				
Table, Headstock and Footstock				
Maximum traverse of table (hydraulic or by hand), mm	1040	220/380 volt, 3 phase, 50 cycle		
Maximum swivel of table, degrees	6	A.C. motors:		
Taper hole in headstock and footstock spindles . . . . .	Morse No. 4	Wheel head . . . . .		
		Power, kW . . . . .	7	
		Speed, r.p.m. . . . .	1500	
		Headstock:		
		Power, kW . . . . .	1.0	
		Speed, r.p.m. . . . .	1000	
		Hydraulic pump:		
		Power, kW . . . . .	1.7	
		Speed, r.p.m. . . . .	1500	
		Coolant pump:		
		Power, kW . . . . .	0.125	
		Speed, r.p.m. . . . .	3000	
<b>Space Occupied</b>				
Wheel Head				
Maximum cross travel of wheel head, mm:	200	Floor space, mm . . . . .	4400 x 1800	
Manual . . . . .	50	Height of machine, mm . . . . .	1520	
Hydraulic (advance) . . . . .				
<b>Weight</b>				
		Net weight, kg . . . . .	approx. 4000	



## CYLINDRICAL PLUNGE-CUT GRINDING MACHINE

MODEL 3162



The 3162 Cylindrical Plunge-Cut Grinder is designed for center-type grinding operations. The machine meets all the requirements of external cylindrical and taper grinding in large or small lots of work, with assured accuracy and fine finish.

The work is set on dead centers and is driven by a driving dog fixed in the headstock face plate. The headstock spindle is driven by a constant speed motor mounted on the headstock. Three work speeds are available.

The rapid advance of wheel to the work, the slow cross feed of wheel (plunge-cut grinding) and the rapid back movement of the wheel to its starting position are operated hydraulically. Manual cross feed of wheel is also provided.

The machine enables grinding with automatic retraction of wheel after the final size of work (according to 3rd class of accuracy) is reached. The machine also enables manual grinding up to a positive stop and provides means for compensating for wheel wear.

СТАНКОИМПОРТ

СТАНКОИМПОРТ

The table can be swiveled for taper grinding.  
The traverse of the table is operated hydraulically. The machine can be used for both plunge-cut and traverse grinding.

#### SPECIFICATIONS

<b>Capacity</b>	<b>Grinding wheel dimensions, mm:</b>		
Maximum swing over table, mm	300	Minimum diameter . . .	500
Distance between centers, mm	1000	Maximum diameter . . .	750
Height of centers, mm	160	Face . . . . .	75
Distance between wheel and work centers (without hydraulic back movement of wheel), mm:		Hole diameter . . . . .	305
Minimum . . . . .			
Maximum . . . . .			
Diameter that can be ground, mm:			
Minimum with wheel 500 mm diameter . . . . .	250	Work speeds, r.p.m. . . . .	60; 120; 240
Maximum with work rest . . . . .	500	Table traverse speeds (hydraulic) . . . . .	100
Maximum without work rest with wheel 750 mm diameter . . . . .	10	Minimum . . . . .	0.1
Maximum . . . . .		Maximum . . . . .	10
Range of wheel cross feeds (plunge-cut grinding), mm/min. . . . .	60	Range of wheel cross feeds (plunge-cut grinding), mm/min. . . . .	0.1—1.5
	250	220/380 volt, 3 phase, 50 cycle	
		A.C. motor(s):	
		Work load:	
		Power, kW . . . . .	14
		Speed, r.p.m. . . . .	1000
		Headstock:	
		Power, kW . . . . .	1.0
		Speed, r.p.m. . . . .	1000
		Hydraulic pump:	
		Power, kW . . . . .	2.8
		Speed, r.p.m. . . . .	1500
		Coolant pump:	
		Power, kW . . . . .	0.125
		Speed, r.p.m. . . . .	3000
<b>Table, Headstock and Footstock</b>	<b>Space Occupied</b>		
Maximum traverse of table (hydraulic and by hand), mm	1050	Floor space, mm . . . . .	3320 × 2300
Maximum swivel of table, degrees . . . . .	7	Height of machine, mm . . . . .	1500
Taper hole in headstock and footstock spindles . . . . . Morse No. 5			
<b>Wheel Head</b>	<b>Weight</b>		
Maximum cross travel of wheel head, mm:			
Manual . . . . .	250	1.6 Net weight, kg . . . . .	approx. 6000
Hydraulic (advance) . . . . .	50		
Graduation of cross feed dial, mm . . . . .	0.005		
Min. (max.) diameter reduction of work (plunge-cut grinding), mm . . . . .			

#### HYDRAULIC CYLINDRICAL GRINDING MACHINE MODEL 3164



The 3164 Hydraulic Cylindrical Grinder is designed for precision center-type grinding operations. The machine meets in every detail all the requirements of plain cylindrical and taper grinding in large or small lots of work, with assured accuracy and fine finish.

The work is set on dead centers and is driven by a driving dog fixed in the headstock face plate. The headstock spindle is driven by a two-speed motor mounted on the headstock. Eight work speeds are available.

The grinding wheel head is supported by large, well spaced guides. The rapid advance of wheel slide to the work, the cross feed at each table reversal and the rapid back movement of the wheel to its starting position are operated hydraulically. Manual cross feed of wheel is also provided.

The table is in two sections, the traversing carriage and the upper portion, on which the headstock, footstock and steadies are mounted. The top table is pivoted at its center and can be swiveled for taper grinding. The traverse of the table is automatic with hand motion for positioning purposes.

Power table traverse, hydraulically operated, provides an infinitely variable range of table speeds and can be adjusted exactly to the requirements of the work. The stroke and reversal of the table are controlled by adjustable dogs.

The machine enables grinding up to a positive stop and provides means for compensating for wheel wear.

**SPECIFICATIONS**

<b>Capacity</b>	<b>Speeds</b>	
Maximum swing over table, mm	400	Work speeds, r.p.m. 30: 48: 60: 75:
Distance between centers, mm	2000	90: 118: 150: 235
Height of centers, mm	210	Table traverse speeds, m/min:
Distance between wheel and work centers (without hydraulic back movement of wheel), mm		Minimum 0.2 Maximum 6
Minimum		
Maximum		
Diameter that can be ground, mm	650	
Minimum	40	
Maximum	400	220-380 volt, 3 phase, 50 cycle
Table, Headstock and Footstock		A.C. motors:
Maximum traverse of table, mm	2000	Wheel head: Power, kW 14 Speed, r.p.m. 1000
Maximum swivel of table, degrees	3.5	Headstock: Power, kW 2.3 Speeds, r.p.m. 750-1500
Taper hole in headstock and footstock spindles . . . Morse No. 6		Hydraulic pump: Power, kW 2.8 Speed, r.p.m. 1500
Wheel Head		Constant pump: Power, kW 0.125 Speed, r.p.m. 3000
Maximum cross travel of wheel head, mm:		
Manual	305	
Hydraulic (advance) . . .	50	<b>Space Occupied</b>
Grinding wheel dimensions, mm:		Floor space, mm 6600 x 2450
Minimum diameter . . .	600	Height of machine, mm 1630
Maximum diameter . . .	900	
Maximum face . . .	100	
Hole diameter . . .	305	<b>Weight</b>
		Net weight, kg approx. 10000



## **HYDRAULIC CYLINDRICAL GRINDING MACHINE**

MODEL 3164 A



The 3164 A Hydraulic Cylindrical Grinding Machine is designed for precision center-type grinding operations. The machine meets in every detail all the requirements of plain cylindrical and taper grinding in large or small lots of work, with assured accuracy and fine finish.

The work is set on dead centers and is driven by a driving dog fixed in the headstock face plate. The headstock spindle is driven by a two-speed motor mounted on the headstock. Eight work speeds are available.

The grinding wheel head is supported by large, well spaced guides. The rapid advance of wheel slide to the work, the cross feed at each table reversal and the rapid back movement of the wheel to its starting position are operated hydraulically. Manual cross feed of wheel is also provided. The table is in two sections, the traversing carriage and the upper portion, on which the headstock, footstock and steady are mounted. The top table is pivoted at its center and can be swiveled for taper grinding. The traverse of the table is automatic with hand motion for positioning purposes.

Power table traverse, hydraulically operated, provides an infinitely variable range of table speeds and can be adjusted exactly to the requirements of the work. The stroke and reversal of the table are controlled by adjustable dogs.

**СТАНКОИМПОРТ**

**СТАНКОИМПОРТ**

The machine enables grinding up to a positive stop and provides means for compensating for wheel wear as well as for grinding with automatic stopping the pick feed action before the cross feed dial reaches zero, permitting the operator to finish to size by hand.

The machine is equipped with five motors.

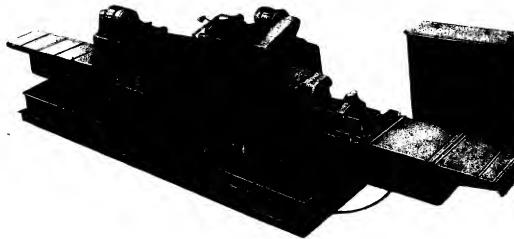
#### SPECIFICATIONS

<b>Capacity</b>		Maximum diameter . . . . .	900
Maximum swing over table, mm	400	Maximum face . . . . .	100
Distance between centers, mm	3000	Hole diameter . . . . .	305
Height of centers, mm	210		
Distance between wheel and work center (without hydraulic back movement of wheel), mm:			
Minimum . . . . .	320	Table traverse speeds, m/min.:	
Maximum . . . . .	650	Minimum . . . . .	0.2
Diameter that can be ground, mm:		Maximum . . . . .	6
Minimum . . . . .	40	<b>Speeds</b>	
Maximum . . . . .	400	Work speeds, r.p.m. . . . .	30; 40; 60; 75;
			90; 118; 150; 235
Table, Headstock and Footstock		Table traverse speeds, m/min.:	
Maximum traverse of table (hydraulic and by hand), mm	3000	Minimum . . . . .	
Maximum swivel of table, degrees	3.5	Maximum . . . . .	
Taper hole in headstock and footstock spindles . . . . .	Morse No. 6	Drive	
Wheel Head		220/380 volt, 3 phase, 50 cycle	
Maximum cross travel of wheel head, mm:		A.C. motors:	
Manual . . . . .	305	Wheel head:	
Hydraulic (advance) . . . . .	50	Power, kW . . . . .	14
Grinding wheel dimensions, mm:		Speed, r.p.m. . . . .	1000
Minimum diameter . . . . .	600	Hydrostat (two-speed):	
		Power, kW . . . . .	2.3
		Speed, r.p.m. . . . .	750/1500
		Hydraulic pump:	
		Power, kW . . . . .	2.8
		Speed, r.p.m. . . . .	1500
		Clutch pump:	
		Power, kW . . . . .	0.125
		Speed, r.p.m. . . . .	3000
		<b>Space Occupied</b>	
		Floor space, mm . . . . .	8420 × 2560
		Height of machine, mm . . . . .	1630
		<b>Weight</b>	
		Net weight, kg . . . . .	approx. 14500



## HEAVY DUTY CYLINDRICAL GRINDING MACHINE

MODEL 3172



The 3172 Cylindrical Grinder is designed for center-type grinding operations. The machine meets all the requirements of plain cylindrical and taper grinding of large and heavy work, with assured accuracy and fine finish.

The work is set on dead centers and is driven by a driving dog fixed in the headstock face plate. Power for the headstock drive as well as for the table traverse is obtained from D.C. motors providing infinitely variable work and table traverse speeds.

The grinding wheel head is supported by large, well spaced guides. The rapid advance of wheel to the work, the cross feed at each table reversal and the rapid back movement of the wheel to its starting position are operated hydraulically. Manual cross feed of wheel is also provided. The table is in two sections, the traversing carriage and the upper portion, on which the headstock, footstock and steady are mounted. The top table is pivoted at its center and can be swiveled for taper grinding.

Power table traverse, electrically operated, provides an infinitely variable range of table speeds and can be adjusted exactly to the requirements of the work. The stroke and reversal of the table are controlled by adjustable dogs.

СТАНКОИМПОРТ

СТАНКОИМПОРТ

The machine enables grinding up to a positive stop and provides means for compensating for wheel wear.  
The correct table and work speeds are indicated by direct reading instruments mounted on the control panel.



## HEAVY DUTY CYLINDRICAL GRINDING MACHINE

MODEL 3174



## SPECIFICATIONS

Capacity	Speeds
Maximum swing over table, mm	Work speeds (infinitely variable), r.p.m.: 550 Minimum . . . . . 12
Distance between centers, mm	Maximum . . . . . 60
Height of centers, mm	Table traverse speeds (infinitely variable), m/min.: 300 Minimum . . . . . 0.1
Distance between tool and work centers (without hydraulic back movement of wheel), mm:	Maximum . . . . . 2.5
Minimum . . . . .	
Maximum . . . . .	
Diameter that can be ground, mm:	
Minimum with wheel 600 mm diameter . . . . .	380
Maximum with wheel 900 mm diameter . . . . .	830
Maximum length that can be ground, mm:	220/380 volt, 3 phase, 50 cycle
Maximum weight of work, kg	N.C. motor:
	Wheel head:
	Power, kW . . . . . 20
	Speed, r.p.m. . . . . 1000
	Hydraulic pump:
	Power, kW . . . . . 2.8
	Speed, r.p.m. . . . . 1500
	Coolant pump:
	Power, kW . . . . . 0.65
	Speed, r.p.m. . . . . 3000
	Wheel head Infringement pump:
	Power, kW . . . . . 0.25
	Speed, r.p.m. . . . . 1500
	Center grinding fixture:
	Power, kW . . . . . 0.6
	Speed, r.p.m. . . . . 1500
	D.C. motors:
	Headstock:
	Power, kW . . . . . 9
	Speeds, r.p.m. . . . . 150—1500
	Table traverse:
	Power, kW . . . . . 1.6
	Speeds, r.p.m. . . . . 40—1000
	Floor space, mm . . . . . 12100 x 4100
	Height of machine, mm . . . . . 2260
Space Occupied	Weight
Maximum cross travel of wheel head, mm:	
Manual . . . . .	
Hydraulic (advance) . . . . .	
Maximum travel of wheel slides, mm:	
Grinding wheel dimensions, mm:	
Minimum diameter . . . . .	
Maximum diameter . . . . .	
Face . . . . .	
Hole diameter . . . . .	
	Net weight, kg . . . . . approx. 30000

The 3174 Cylindrical Grinder is designed for center-type grinding operations. The machine meets all the requirements of plain cylindrical and taper grinding of large and heavy work, with assured accuracy and finish.

The work is set on dead centers and is driven by a driving dog fixed in the headstock face plate.

Power for the headstock drive as well as for the table traverse is obtained from D.C. motors providing infinitely variable work and table traverse speeds.

The grinding wheel head is supported by large, well spaced guides. The rapid advance of wheel to the work, the cross feed at each table reversal and the rapid back movement of the wheel to its starting position are operated hydraulically. Manual cross feed of wheel is also provided.

The table is in two sections, the traversing carriage and the upper portion, on which the headstock, footstock and stades are mounted.

The top table is pivoted at its center and can be swiveled for taper grinding.

Power table traverse, electrically operated, provides an infinitely variable range of table speeds and can be adjusted exactly to the requirements of the work. The stroke and reversal of the table are controlled by adjustable dogs.

The machine enables grinding up to a positive stop and provides means for compensating for wheel wear.

The correct table and work speeds are indicated by direct reading instruments mounted on the control panel.

СТАНКОИМПОРТ

СТАНКОИМПОРТ

**SPECIFICATIONS****Capacity**

Maximum swing over table, mm	750
Distance between centers, mm	5000
Height of centers, mm	400
Distance between wheel and work centers (without hydraulic center movement of wheel), mm:	
Minimum	400
Maximum	725
Diameter that can be ground, mm:	
Minimum	100
Maximum	700
Maximum weight of work, kg	7500

**Speeds**

Work speeds (infinitely variable), r.p.m.	
Minimum	8
Maximum	40

**Table traverse speeds (infinitely variable), mm/min.**

Minimum	0.1
Maximum	2.5

**Drive****220/380 volt, 3 phase, 50 cycle**

A.C. motors:	
Wheel head:	
Power, kW	20
Speed, r.p.m.	1000
Hydraulic pump:	
Power, kW	2.8
Speed, r.p.m.	1500
Coolant pump:	
Power, kW	0.65
Speed, r.p.m.	3000
Work head lubricating pump:	
Power, kW	0.25
Speed, r.p.m.	1500
Center grinding fixture:	
Power, kW	0.6
Speed, r.p.m.	1500

**D.C. motors:**

Headstock:	
Power, kW	9
Speeds, r.p.m.	150—1500
Table traverse:	
Power, kW	1.6
Speeds, r.p.m.	40—1000

**Space Occupied**

Floor space, mm	14700 > 3580
Height of machine, mm	2250

**Weight**

Hole diameter	approx. 40000
Minimum diameter	600
Maximum diameter	900
Face	100
Hole diameter	305



## HEAVY DUTY CYLINDRICAL GRINDING MACHINE

MODEL XIII-80



The XIII-80 Cylindrical Grinder is designed for center-type grinding operations. The machine meets all the requirements of plain cylindrical grinding of large and heavy work, with assured accuracy and fine finish.

The work is set between dead centers and on special steady rests and is driven by a driving dog fixed in the headstock face plate. Power for the headstock drive as well as for the table traverse is obtained from D.C. motors providing infinitely variable work and table traverse speeds.

The grinding wheel head is supported by large, well spaced guides. The rapid advance of wheel to the work and the rapid back movement of the wheel to its starting position are operated hydraulically.

Power table traverse, electrically operated, provides an infinitely variable range of table speeds and can be adjusted exactly to the requirements of the work. The stroke and reversal of the table are controlled by adjustable dogs.

The machine enables grinding up to a positive stop and provides means for compensating for wheel wear.

The correct table and work speeds are indicated by direct reading instruments mounted on the control panel.

СТАНКОИМПОРТ

СТАНКОИМПОРТ

**SPECIFICATIONS****Capacity**

Maximum swing over table, mm . . . . .  
 Distance between centers, mm . . . . .  
 Height of center, mm . . . . .  
 Distance between wheel and work centers, mm . . . . .

Minimum . . . . .  
 Maximum . . . . .  
 Diameter that can be ground, mm . . . . .  
 Minimum . . . . .  
 Maximum . . . . .

Maximum length that can be ground, mm . . . . .

**Table, Headstock and Footstock**

Maximum traverse of table, mm . . . . .  
 Taper hole in headstock and footstock spindles . . . . . Metric 100

**Wheel Head**

Maximum cross travel of wheel head, mm . . . . .  
 Manual . . . . .

Hydraulic (advance) . . . . .  
 Maximum travel of wheel slide, mm . . . . .

Grinding wheel dimensions, mm . . . . .  
 Minimum diameter . . . . .  
 Maximum diameter . . . . .  
 Face . . . . .  
 Hole diameter . . . . .

**Speeds**

Work speeds (infinitely variable), r.p.m.:  
 Minimum . . . . .  
 Maximum . . . . .

Table traverse speeds (infinitely variable), m/min.:  
 750 Minimum . . . . . 0.1  
 8000 Maximum . . . . . 2.5  
 400

**Drive**

A.C. motors:  
 Wheel head:  
 Power, kW . . . . . 20  
 Speed, r.p.m. . . . . 1000

Hydraulic pump:  
 Power, kW . . . . . 1.7  
 Speed, r.p.m. . . . . 1500

Coolant pump:  
 Power, kW . . . . . 0.65  
 Speed, r.p.m. . . . . 3000

Lubricating pump:  
 Power, kW . . . . . 0.25  
 Speed, r.p.m. . . . . 1500

Center grinding fixture:  
 Power, kW . . . . . 1.0  
 Speed, r.p.m. . . . . 1500

D.C. motors:  
 Headstock:  
 Power, kW . . . . . 9  
 Speed, r.p.m. . . . . 150—1500

Taper traverse:  
 Power, kW . . . . . 1.6  
 Speeds, r.p.m. . . . . 40—1000

**Space Occupied**

Floor space, mm . . . . . 20100 × 3700  
 Height of machine, mm . . . . . 2250

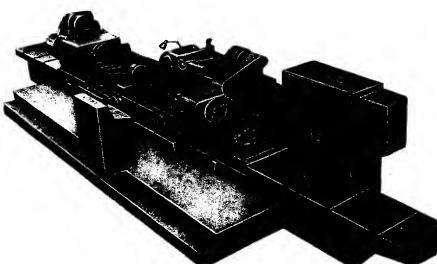
**Weight**

40 Net weight, kg . . . . . approx. 55000



## **HEAVY DUTY CYLINDRICAL GRINDING MACHINE**

MODEL XIII-84



The XIII-84 Cylindrical Grinder is designed for center-type grinding operations. The machine meets all the requirements of plain cylindrical and taper grinding of large and heavy work, with assured accuracy and finish.

The work is set between dead centers and on special steady rests and is driven by a driving dog fixed in the headstock face plate.

Power for the headstock drive as well as for the table traverse is obtained from D.C. motors providing infinitely variable work and table traverse speeds.

The grinding wheel head is supported by large, well spaced guides. The rapid advance of wheel to the work and the rapid back movement of the wheel to its starting position are obtained from A.C. motor. Cross feed of wheel head is operated hydraulically.

The table is in two sections, the traversing carriage and the upper portion, on which the headstock, footstock and steady are mounted.

The top table is pivoted at its center and can be swiveled for taper grinding.

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Power table traverse, electrically operated, provides an infinitely variable range of table speeds and can be adjusted exactly to the requirements of the work. The stroke and reversal of the table are controlled by adjustable dogs.

The machine enables grinding up to a positive stop and provides means for compensating for wheel wear.

The correct table traverse and work speeds are indicated by direct reading instruments mounted on the control panel.

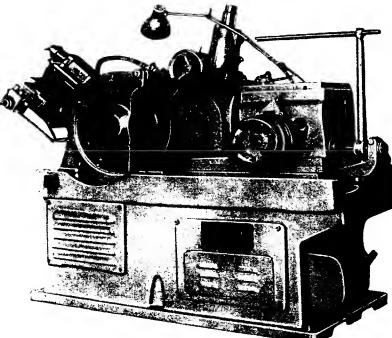
#### SPECIFICATIONS

Capacity		Table traverse speeds (infinitely variable), m/min.	
Maximum swing over table, mm	750	Minimum	0.1
Distance between centers, mm	4000	Maximum	2.5
Height of centers, mm	400		
Distance between wheel and work, mm:			
Minimum . . . . .	320	220/380 volt, 3 phase, 50 cycle	
Maximum . . . . .	830	A.C. motors:	
Diameter that can be ground, mm:		Wheel head:	
Minimum . . . . .	80	Power, kW . . . . .	20
Maximum . . . . .	750	Speed, r.p.m. . . . .	1000
Maximum weight of work, kg	5000	Hydraulic pump:	
		Power, kW . . . . .	1.7
		Speed, r.p.m. . . . .	1500
		Wheel head traverses:	
		Power, kW . . . . .	0.6
		Speed, r.p.m. . . . .	1500
		Lubricating pump:	
		Power, kW . . . . .	0.25
		Speed, r.p.m. . . . .	1500
		Coolant pump:	
		Power, kW . . . . .	0.45
		Speed, r.p.m. . . . .	3000
		Center grinding fixture:	
		Power, kW . . . . .	1.0
		Speed, r.p.m. . . . .	1500
		D.C. motors:	
		Hydroseal:	
		Power, kW . . . . .	9
		Speeds, r.p.m. . . . .	150—1500
		Table traverse:	
		Power, kW . . . . .	1.6
		Speeds, r.p.m. . . . .	40—1000
		Space Occupied	
		Floor space, mm . . . . .	12000 × 3850
		Height of machine, mm . . . . .	2210
Speeds		Weight	
Work speeds (infinitely variable), r.p.m.:		60	Net weight, kg . . . . . appox. 32000
Minimum . . . . .	12		
Maximum . . . . .	60		



#### CENTERLESS GRINDING MACHINE

MODEL 3180



The 3180 Centerless Grinding Machine is designed for external centerless grinding a very wide range of work including plain cylindrical, taper, shoulder, formed and multi-diameter in lot and mass production.

The machine has two wheels: a high speed grinding wheel and an opposed slowly rotating regulating wheel. A work rest supports the work during grinding. The grinding wheel serves solely for grinding purposes, while the regulating wheel controls sizing, speed of work rotation and the longitudinal feeding movement of the work.

There are three principal methods of grinding the work: through-feed, infed, and combination infed and through-feed. Plain cylindrical parts are ground by the through-feed method. The work pieces are fed in at one side and pass between the grinding and regulating wheels leaving the machine at the other side. Workpieces having a form or shoulder are ground by the

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infeed method. The work is placed on the work rest with wheel withdrawn, the wheel receives then a cross feed up to a stop; on completion of operation the work is automatically ejected.

The work speed depends on the regulating wheel speed, this being changed by pick-off gears.

The angle at which the regulating wheel is set and its speed determine the longitudinal feed of work through the machine for through-feed method.

Truing of the grinding and regulating wheels is performed with special truing devices.

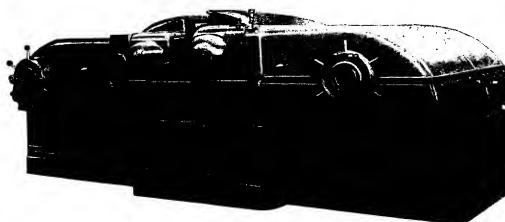
#### SPECIFICATIONS

<b>Capacity</b>		Number of regulating wheel speeds	9
Minimum and maximum diameter of work to be ground in standard attachment, mm		Range of regulating wheel speeds, r.p.m.	13—300
<b>Grinding Wheel</b>		Drive	
Minimum and maximum diameter of grinding wheel, mm	395—500	220/380 volt, 3 phase, 50 cycle	
Maximum width of grinding wheel, mm	150	A.C. motors:	
Maximum swivel of grinding wheel truing device	±5°	Grinding wheel:	
		Power, kW . . . . .	14
		Speed, r.p.m. . . . .	1500
		Regulating wheel:	
		Power, kW . . . . .	1
		Speed, r.p.m. . . . .	1500
		Hydraulic pump:	
		Power, kW . . . . .	0.6
		Speed, r.p.m. . . . .	1500
<b>Regulating Wheel</b>		Cooling pump:	
Maximum swivel of regulating wheel head	6	Power, kW . . . . .	0.15
Minimum and maximum diameter of regulating wheel, mm	260—300	Speed, r.p.m. . . . .	3000
Maximum width of regulating wheel, mm	150	<b>Space Occupied</b>	
		Floor space, mm . . . . .	2265 / 1650
		Height of machine, mm . . . . .	1620
<b>Speeds</b>		<b>Weight</b>	
Speed of grinding wheel, r.p.m.	1200	Net weight, kg . . . . .	approx. 3600



## CENTERLESS GRINDING MACHINE

MODEL 3 A 182



The 3 A 182 Centerless Grinding Machine is designed for centerless grinding a very wide range of work including plain cylindrical, taper, shouldered, and multi-diameter.

The machine has two wheels: a high speed grinding wheel and an opposed slowly rotating regulating wheel, forming a grinding throat between them. A work rest in the throat supports the work during grinding. The grinding wheel serves solely for grinding purposes, while the regulating wheel controls sizing, speed of work rotation and the longitudinal feeding movement of the work.

There are three principal methods of grinding the work: through-feed, infeed, and combination infeed and through-feed. Plain cylindrical parts are ground by the through-feed method. The workpieces are fed in at one side and pass between the grinding and regulating wheels leaving the machine at the other side.

Workpieces having a form or shoulder are ground by the infeed method. The workpiece is placed on the work rest with the wheel withdrawn, the wheel receives then a cross feed up to a stop; on completion of operation the work is automatically ejected.

The work speed depends on the number of revolutions per minute of the regulating wheel.

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The regulating wheel speed and the grinding wheel cross feed are changed by pick-off gears.

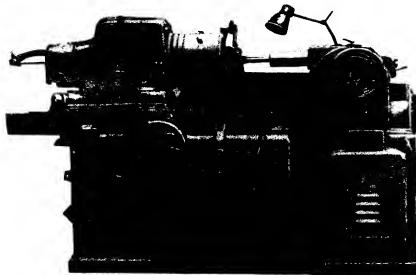
The angle at which the regulating wheel is set and its speed determine the longitudinal feed of work through the machine for through-feed method.

Truing of the grinding and regulating wheels is performed with special truing devices.



## INTERNAL GRINDING MACHINE

MODEL 3A240



### SPECIFICATIONS

<b>Capacity</b>	
Maximum grinding diameter, mm	150
Range of recommended grinding diameters, mm	10—75
<b>Grinding Wheel</b>	
Grinding wheel dimensions, mm:	
Maximum diameter . . . . .	500
Minimum diameter . . . . .	380
Maximum width (sectorial wheel) . . . . .	800
Maximum travel of grinding wheel head, mm . . . . .	200
<b>Regulating Wheel</b>	
Regulating wheel dimensions, mm:	
Maximum diameter . . . . .	350
Minimum diameter . . . . .	280
Maximum width (sectorial wheel) . . . . .	800
Maximum swivel of spindle . . . . .	5°
Maximum travel of regulating wheel head, mm . . . . .	150
<b>Speeds</b>	
Grinding wheel speed, r.p.m.	1370
Number of regulating wheel speeds . . . . .	7
Range of regulating wheel speeds, r.p.m. . . . .	11—300
<b>Drive</b>	
10—75	220/380 volt, 2 phase, 50 cycle
A.C. motor:	
Grinding wheel:	
Power, kW . . . . .	40
Speed, r.p.m. . . . .	1500
Regulating wheel:	
Power, kW . . . . .	4.5
Speed, r.p.m. . . . .	1500
Grinding wheel feed:	
Power, kW . . . . .	1
Speed, r.p.m. . . . .	1000
Work holding devices (2 pos.):	
Power, kW . . . . .	0.15
Speed, r.p.m. . . . .	3000
Machine lubricating:	
Oil pump . . . . .	0.65
Speed, r.p.m. . . . .	3000
Coolant pump:	
Power, kW . . . . .	0.65
Speed, r.p.m. . . . .	3000
<b>Space Occupied</b>	
Floor space, mm . . . . .	3600 × 2310
Height of machine, mm . . . . .	1310
<b>Weight</b>	
Net weight kg . . . . .	approx. 11000

The 3A240 Hydraulic Internal Grinding Machine is designed for grinding straight and tapered holes.

The work to be ground is held in a chuck mounted on the spindle of the work head. The work head spindle is driven by a Vee-belt from a three-speed motor mounted on the work head assembly. The work head base is of swiveling type providing for grinding a maximum included angle of 20°.

Power traverse of the table carrying the work head is operated hydraulically, the speed being controlled by a hydraulic control valve.

Hand table travel used for positioning purposes is controlled with the large diameter handwheel. The stroke of the table is set by adjustable dogs. The hand travel and hydraulic traverse of the table are interlocked.

The grinding wheel spindle is driven from a motor mounted on the bed. The automatic cross feed to the cross slide carrying the wheel head is applied through a ratchet mechanism. Sensitive hand motion is also provided. The automatic feed mechanism operates at every other reversal of the table. The wheel truing device has micrometer adjustment to the diamond. The machine is equipped with three motors.

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**SPECIFICATIONS****Capacity**

Diameter of hole that can be ground, mm:  
 Minimum . . . . .  
 Maximum . . . . .  
 Maximum length that can be ground, mm . . . . .  
 Maximum swing, mm . . . . .  
 Inside work guard . . . . .  
 With outer work guard . . . . .  
 Distance from center of spindle to table, mm . . . . .  
 Grinding wheel cross movement to center of work head, mm . . . . .  
 Forward . . . . .  
 Backward . . . . .  
 Maximum distance from work head spindle to wheel head flange, mm . . . . .

**Table, Work Head, Wheel Head**

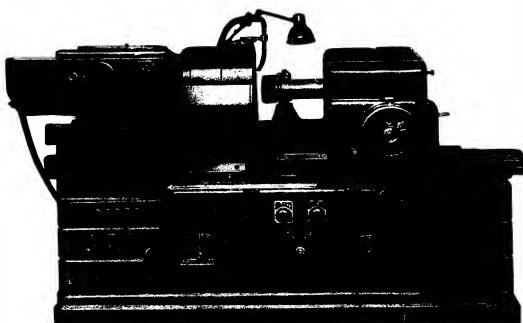
Maximum traverse of table, mm . . . . .  
 Swivel of work head for taper grinding, degrees . . . . .  
 Work head spindle hole diameter, mm . . . . .  
 Maximum cross traverse of wheel head slide, mm . . . . .  
 Grinding wheel dimensions, mm:  
 Minimum diameter . . . . .  
 Maximum diameter . . . . .  
 Maximum face . . . . .

**Speeds and Feeds**

Work head spindle speeds, r.p.m.	180; 290; 570
Wheel head spindle speeds, r.p.m.	15000
Table speeds (hydraulic), m/min.	
Minimum . . . . .	0.3
Maximum . . . . .	8
Wheel head cross feed per stroke of table, mm:	
Minimum . . . . .	0.001
Maximum . . . . .	0.005
Drive	
25	380 volt, 3 phase, 50 cycle
15	A.C. motors:
	Wheel head and hydraulic pump:
670	Power, kW . . . . .
	Speed, r.p.m. . . . .
	Work head (three-speed):
380	Power, kW . . . . .
	Speeds, r.p.m. . . . .
10	Control:
	Power, kW . . . . .
27	Speed, r.p.m. . . . .
	Space Occupied
40	Floor space, mm . . . . .
	Height of machine, mm . . . . .
10	Weight
80	Net weight, kg . . . . .
50	approx. 1900

**INTERNAL GRINDING MACHINE**

MODEL 3A 250



The 3A 250 Hydraulic Internal Grinding Machine is designed for grinding straight and tapered holes.

The work to be ground is held in a chuck mounted on the spindle of the work head. The work head spindle is driven by a two-speed motor, the work speeds being stepless regulated by means of a Vee-belt variable speed unit. The work head base is of swiveling type providing for grinding a maximum included angle of 60°.

Power traverse of the table carrying the wheel head is operated hydraulically, the speed being controlled by a hydraulic control valve. Hand table travel used for positioning purposes is also provided. The stroke of the table is set by adjustable dogs.

The grinding wheel spindle is driven from a separate electric motor. The automatic cross feed to the cross slide carrying the wheel head is applied

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through a ratchet mechanism. The automatic feed mechanism operates at every other reversal of the table. Sensitive hand motion is also provided.

Truing of the grinding wheel is effected by means of a special wheel truing device by either a diamond or dresser.

The machine is equipped with four motors.

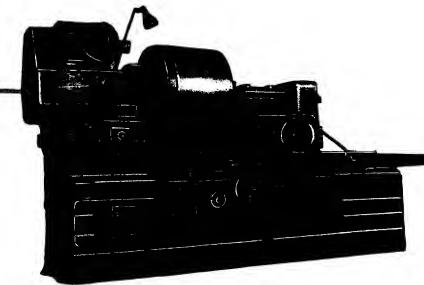
#### SPECIFICATIONS

<b>Capacity</b>	Range of work head spindle speeds (indefinitely variable), r.p.m.		
Diameter of hole that can be ground, mm:			
Minimum . . . . .	50	First range . . . . .	150—290
Maximum . . . . .	200	Second range . . . . .	290—380
Maximum length that can be ground, mm . . . . .	200	Table speeds (hydraulic), m/min.:	
Maximum swing, mm:		Minimum . . . . .	0.8
Inside water guard . . . . .	420	Maximum . . . . .	10
Water-coated guard . . . . .	620	Wheel head cross feed per stroke of table, mm:	
Distance from center of spindle to table, mm . . . . .	315	Minimum . . . . .	0.0025
Maximum distance from work head spindle to wheel head . . . . .	900	Maximum . . . . .	0.0125
Grinding wheel cross movement to center of work head, mm:			
Forward . . . . .	25	Drive:	
Backward . . . . .	110	380 volt, 3 phase, 50 cycle A.C. motors:	
Table, Work Head, Wheel Head		Wheel head:	
Maximum traverse of table (hydraulic and by hand), mm . . . . .	500	Power, kW . . . . .	4.5
Swivel of work head for taper grinding, degrees . . . . .	30	Speed, r.p.m. . . . .	3000
Grinding wheel dimensions, mm:		Work head (two-speed):	
Minimum diameter . . . . .	40	Power, kW . . . . .	0.7/1.2
Maximum diameter . . . . .	150	Speeds, r.p.m. . . . .	750/1500
Maximum face . . . . .	50	Hydraulic pump:	
Wheel head spindle speed, r.p.m. . . . .		Power, kW . . . . .	2.8
		Speed, r.p.m. . . . .	1500
		Coolant pump:	
		Power, kW . . . . .	0.125
		Speed, r.p.m. . . . .	3000
		<b>Space Occupied</b>	
		Floor space, mm . . . . .	2700 × 1250
		Height of machine, mm . . . . .	1420
		<b>Weight</b>	
		Net weight, kg . . . . .	approx. 3300



#### INTERNAL GRINDING MACHINE

MODEL 3260



The 3260 Hydraulic Internal Grinding Machine is designed for grinding straight and tapered holes.

The work to be ground is held in a chuck mounted on the spindle of the work head. The work head spindle is driven by a belt from a three-speed motor mounted on the work head. The work head base is of swiveling type providing for grinding a maximum included angle of 60°.

Power traverse of the table carrying the wheel head is operated hydraulically, the speed being controlled by a hydraulic control valve. Hand table travel used for positioning purposes is also provided. The stroke of the table is set by adjustable dogs.

The grinding wheel spindle is driven by an endless belt from a separate electric motor.

The automatic cross feed to the cross slide carrying the wheel head is applied through a ratchet mechanism. The automatic feed mechanism operates at every other reversal of the table. Truing of the grinding wheel is effected by means of a special wheel truing device by either a diamond or dresser.

The machine is equipped with four motors.

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**SPECIFICATIONS****Capacity**

Diameter of hole that can be ground, mm:

Minimum . . . . .

Maximum . . . . .

Maximum length that can be ground, mm:

Minimum . . . . .

Maximum, mm:

Inside water guard . . . . .

Without water guard . . . . .

Distance from center of spindle to table, mm:

Maximum distance from work head spindle to wheel head flange, mm:

Grinding wheel cross movement to center of work head, mm:

Forward . . . . .

Backward . . . . .

Table, Work Head, Wheel Head

Maximum traverse of table (hydraulic and by hand), mm:

Swivel of work head for taper grinding, degrees . . . . .

Grinding wheel dimensions, mm:

Minimum diameter . . . . .

Maximum diameter . . . . .

Maximum face . . . . .

**Speeds and Feeds**

Wheel head spindle speed, r.p.m. . . . .

Work head spindle speeds, r.p.m. . . . . 27; 35; 55; 95; 122; 187  
Table speeds (hydraulic), m/min. . . . .150 Minimum . . . . . 0.3  
500 Maximum . . . . . 10

500 Wheel head cross feed per stroke of table, mm: . . . . .

680 Minimum . . . . . 0.005  
780 Maximum . . . . . 0.030

400 Drive

1620 380 volt, 3 phase, 50 cycle  
A.C. motors:

Wheel head:

Power, kW . . . . . 4.5  
Speed, r.p.m. . . . . 3000

Work head (three-speed):

Power, kW . . . . . 2.7 3.2 4.0  
Speeds, r.p.m. . . . . 750 1000/1500

Hydraulic pump:

Power, kW . . . . . 2.8  
Speed, r.p.m. . . . . 1500

Coolant pump:

Power, kW . . . . . 0.125  
Speed, r.p.m. . . . . 3000

Space Occupied

125 Minimum diameter . . . . .

200 Floor space, mm . . . . . 3800 1550

100 Height of machine, mm . . . . . 1800

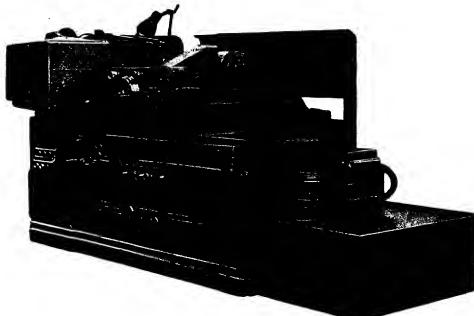
Weight

3000 Net weight, kg . . . . . approx. 5200



## AUTOMATIC CENTERLESS INTERNAL GRINDING MACHINE

MODEL 3263



The 3263 Automatic Centerless Internal Grinding Machine is designed for grinding cylindrical and tapered bores of ball and roller bearing races and other similar parts in lot and mass production.

The workpiece is set up between three rolls mounted on the work head: a support roll, a pressure roll and a regulating roll, the latter for driving the work.

To set the work to a given angle for taper grinding the work head is swiveled in a horizontal plane.

Longitudinal traverse of the table and cross feed of the wheel head are operated hydraulically.

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The machine is equipped with a loading magazine and operates on the following automatic cycle: work feeding to working position; rough grinding; wheel truing; finish grinding, and work unloading.

The grinding wheel wear is compensated for by a corresponding setting of the feed mechanism.

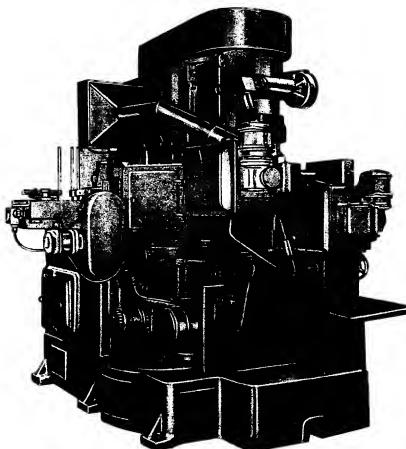
#### SPECIFICATIONS

<b>Capacity</b>		<b>Speeds and Feeds</b>	
Outside diameter of work ground, mm:		Range of regulating roll speeds, r.p.m.	100—200
Minimum . . . . .	70	Speeds of grinding wheel, r.p.m.	9000; 12000
Maximum . . . . .	200	Range of table longitudinal speeds, m/min.	0.5—12
Diameter of hole ground, mm:		Minimum and maximum wheel head feed, mm/min.	0.03—0.1
Minimum . . . . .	60		
Maximum . . . . .	175		
Machine length of hole ground, mm:	100		
Maximum table longitudinal traverse, mm:	500	Power of electric motors, kW	7.85
Maximum cross traverse of grinding wheel, mm:	100		
Maximum swivel of work head . . . . .	30°	Space Occupied	
Diameter of grinding wheel, mm:		Floor space, mm . . . . .	3245 × 1450
Minimum . . . . .	30	Height of machine, mm . . . . .	1540
Maximum . . . . .	100		
<b>Weight</b>		<b>Weight</b>	
		Net weight, kg . . . . . approx. 5600	



## VERTICAL DOUBLE SPINDLE PISTON RING GRINDING MACHINE

MODEL 3317



The 3317 Piston Ring Grinding Machine is designed for the precision finish grinding of piston ring sides in mass manufacture at a very high rate of production.

Two grinding wheels with offset spindles running in the vertical position and revolving in the same direction at the same speed grind both piston ring sides simultaneously. The rings are fed to the grinding wheels by a work

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feed mechanism of the semi-automatic magazine type equipped with endless feed chains. The feeds are changed by suitable interchangeable chain sprockets. Entering the grinding zone the ring receives a rotation in the clockwise direction; then, in the middle of the grinding zone the ring is rotated counter clockwise and when leaving the grinding zone the work is again rotated clockwise. This produces very accurately ground rings, flat, parallel and of a high degree of finish.

The machine has both manually operated and power driven wheel spindle feeds.

The machine is equipped with a wheel truing device and with an exhausting system for the vapour of kerosene which is part of the coolant fluid.

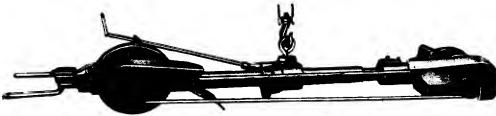
#### SPECIFICATIONS

Capacity	Drive	
Diameter of piston rings ground, mm:	220/380 volt, 3 phase, 50 cycle	
Minimum . . . . .	A. C. motor:	
Maximum . . . . .	Grinding wheel:	
75	Power, kW . . . . .	7
180	Speed, r.p.m. . . . .	1500
	Wheel spindle rapid movement:	
	Power, kW . . . . .	0.41
	Speed, r.p.m. . . . .	1500
	Wire feed mechanism:	
	Power, kW . . . . .	0.25
	Speed, r.p.m. . . . .	1500
	Belt conveyor:	
	Power, kW . . . . .	0.25
	Speed, r.p.m. . . . .	1500
	Exhausting system:	
	Power, kW . . . . .	0.25
	Speed, r.p.m. . . . .	1500
Wheel Heads	Wheel truing device:	
Maximum vertical travel of grinding spindle, mm . . . . .	Power, kW . . . . .	0.25
50	Speed, r.p.m. . . . .	1500
Distance from grinding wheel face to grinding surface, mm:		
Minimum . . . . .		
Maximum . . . . .		
50		
Grinding wheel dimensions, mm:		
External diameter . . . . .		
750		
Hole diameter . . . . .		
350		
Minimum height . . . . .		
15		
Maximum height . . . . .		
40		
Grinding wheel feed, mm/min. . . . .	Coolant pump:	
40	Power, kW . . . . .	0.65
Piston ring feeds, m/min. . . . .	Speed, r.p.m. . . . .	3000
15.8; 22.4; 31.6	Space Occupied	
	Floor space, mm . . . . .	2980 × 2865
	Height of machine, mm . . . . .	2865
	Weight	
	Net weight, kg . . . . .	approx. 9500



#### SWING FRAME GRINDING MACHINE

MODEL 3374 K



The 3374 K Swing Frame Grinding Machine is designed for cleaning, rough grinding and buffing castings, sheets, tubings, bars, shapes, etc. which are too large and unwieldy for the usual standard floor grinders.

The machine is suspended by a chain or wire rope from a floor crane, movable hoist, regular shop crane, or any overhead arrangement, thus it can be freely swung in any direction.

The wheel head can be swiveled and locked in any position up to 45°.

The machine is supplied with a steel guard over the wheel, which together with the all rigid construction ensures maximum possible safety.

The weight of the motor and the counter balancing weights make operation of the machine light and easy to handle and do not tire the operator.

#### SPECIFICATIONS

Grinding Wheel	Drive	
Grinding wheel dimensions, mm:	220/380 volt, 3 phase, 50 cycle	
Minimum diameter . . . . .	A. C. motor:	
270	Power, kW . . . . .	4.5
Maximum diameter . . . . .	Speed, r.p.m. . . . .	3000
400		
Face . . . . .	Overall Dimensions	
40	Overall length, mm . . . . .	2550
	Width, mm . . . . .	540
	Height, mm . . . . .	660
Grinding wheel speed, r.p.m. . . . .	Weight	
30—44.5	Net weight, kg . . . . .	approx. 270
Grinding wheel surface speed, m/sec. . . . .		

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## FLEXIBLE SHAFT PORTABLE GRINDER

MODEL 3382



The 3382 Flexible Shaft Portable Grinder is designed for many different grinding, cleaning, buffing, etc. operations on large parts in any shop. In foundries it may be used for removing excess metal, blending various radii, removing parting lines, cleaning, etc. In welding shops it may be used for grinding of the high spots left by the welding process. Machine shops use it for burring and cleaning of castings, blending of metal parts, breaking corners, and for many other different operations.

The grinding wheel spindle is driven by electric motor mounted on carriage through Vee-belt drive and flexible shaft. The flexible shaft is left rotating. Two handles at each side of the grinding wheel head are designed for holding the wheel head during operation. After finishing the operation the grinding wheel head is laid on two supports of the electric motor housing.

The carriage is mounted on three wheels and may be easily moved from place to place as needed.

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#### SPECIFICATIONS

**Grinding Wheel**  
Grinding wheel diameter, mm . . . . .  
Grinding wheel width, mm . . . . .  
Grinding wheel speed, r.p.m.

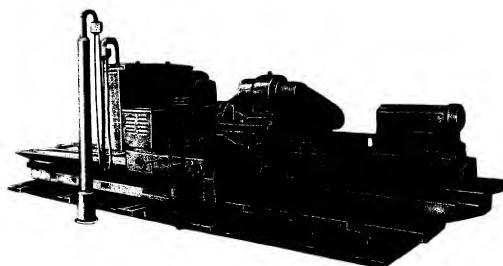
Space Occupied	
200	Floor space, mm . . . . .
25	725 × 530
2160	Height, mm . . . . .
	740

**Drive**  
220/380 volt, 3 phase, 50 cycle  
A.C. motor:  
Power, kW . . . . .  
Speed, r.p.m. . . . . .

Weight	
2.8	
1500	Net weight, kg . . . . . approx. 175



#### ROLL GRINDING MACHINE MODEL 3415 E



The 3415 E Roll Grinding Machine is designed for the grinding of large mill rolls with either straight, concaved or crowned bodies. Parallel or taper roll journals and the adjacent radii from 5 to 50 mm may also be ground in this machine. The machine is of the moving wheel head type in which the grinding wheel is traversed up and down the length of the roll, which is rotated but does not move lengthwise.

The three fundamental motions — the work revolving movement, the grinding wheel and the grinding saddle traverse — each have an independent variable stepless drive from D.C. motors. The wheel head traverse speed and the number of revolutions in minute of both the work and grinding wheel are indicated by special instruments on the control panel.

The machine is equipped with a center grinding attachment which is driven by a separate motor.

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**SPECIFICATIONS****Capacity**

Height of centers over bed, mm  
Maximum length of work ground, mm  
Diameter of work ground, mm:  
Maximum, with 600 mm diameter wheel  
Minimum, with 900 mm diameter wheel  
Maximum eccentricity of crown machine will grind, mm  
Maximum length of taper ground, mm  
Maximum weight machine will carry, kg

**Grinding Saddle and Wheel Head**

Maximum grinding saddle traverse, mm  
Grinding saddle travel per one revolution of hand-wheel, mm  
Wheel head cross movement, mm  
Grinding wheel diameter, mm:

Maximum . . . . .  
Minimum . . . . .

**Headstock and Footstock**

Taper hole in headstock and footstock spindles Metric 140  
Maximum movement of footstock spindle, mm . . . . .

**Speeds and Feeds**

Grinding wheel spindle speeds (infinitely variable), r. p. m.:

Minimum . . . . .  
Maximum . . . . .

Work speeds (infinitely variable), r. p. m.:  
Minimum . . . . .  
Maximum . . . . .

Grinding saddle traverse speeds (infinitely variable), m/min.:  
Minimum . . . . . 0.05  
Maximum . . . . . 2.5

Wheel head cross feed, per one tooth of ratchet, mm . . . . . 0.005

**Drive**

D.C. electric motors:  
Grinding wheel:  
Power, kW . . . . . 29  
Speed, r.p.m. . . . . 500—1000

Work revolving mechanism:  
Power, kW . . . . . 34  
Speed, r.p.m. . . . . 1580

Grinding saddle traverse:  
Power, kW . . . . . 5.6  
Speed, r.p.m. . . . . 1000

A.C. motors:  
Footstock travel:  
Power, kW . . . . . 1.7  
Speed, r.p.m. . . . . 1000

Coolant pump (two motors):  
Power, kW . . . . . 0.65  
Speed, r.p.m. . . . . 3000

Wheel head movement:  
Power, kW . . . . . 1.0  
Speed, r.p.m. . . . . 1500

Hydraulic pump:  
Power, kW . . . . . 1.0  
Speed, r.p.m. . . . . 1500

Center grinding attachment:  
Power, kW . . . . . 1  
Speed, r.p.m. . . . . 1000

**Space Occupied**

Floor space, mm . . . . . 9680 × 4320

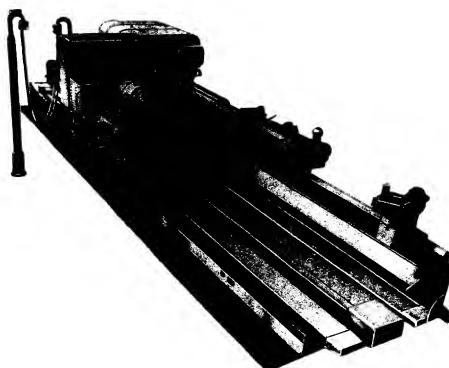
Height of machine, mm . . . . . 2500

**Weight**

Net weight, kg . . . . . approx. 60000

**ROLL GRINDING MACHINE**

MODEL 3415 K



The 3415 K Roll Grinding Machine is designed for the grinding of large mill rolls with either straight, concaved or crowned bodies.

Parallel or taper roll journals and the adjacent radii from 5 to 50 mm may also be ground in this machine.

The machine is of the moving wheel head type in which the grinding wheel is traversed up and down the length of the roll, which is rotated but does not move lengthwise.

The three fundamental motions — the work revolving movement, the grinding wheel and the grinding saddle traverse — each have an independent variable stepless drive from D.C. motors.

The wheel head traverse speed and the number of revolutions in minute

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of both the work and grinding wheel are indicated by special instruments on the control panel.

The machine is equipped with a center grinding attachment which is driven by a separate motor.

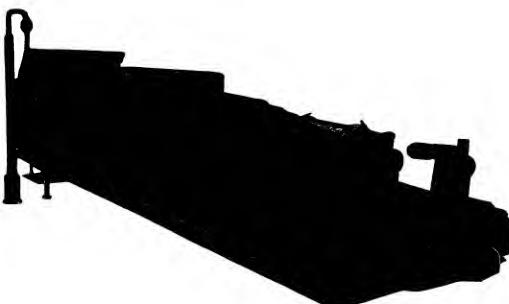
#### SPECIFICATIONS

Capacity		Grinding saddle traverse speeds (ininitely variable), m/min:
Height of centers over bed, mm:	600	Minimum . . . . . 0.05
Maximum length of work ground, mm:	7500	Maximum . . . . . 2.5
Diameter of work ground, mm:		Wheel head cross feed, per one tooth of ratchet, mm . . . . . 0.005
Maximum, with 600 mm diameter wheel . . . . .	1000	D. C. electric motors:
Minimum, with 900 mm diameter wheel . . . . .	200	Grinding wheel:
Maximum concavity or crown machine will grind, mm:	1	Power, kW . . . . . 29
Maximum length of taper ground, mm:	500	Speed, r.p.m. . . . . 1000
Maximum weight machine will carry, kg . . . . .	20000	Work revolving mechanism:
Grinding Saddle and Wheel Head		Power, kW . . . . . 34
Maximum grinding saddle traverse, mm . . . . .	7500	Speed, r.p.m. . . . . 1580
Grinding saddle travel per one revolution of handwheel, mm . . . . .	220/380 volt, 3 phase, 50 cycle	Grinding saddle traverse:
Wheel head cross movement, mm . . . . .	1	Power, kW . . . . . 5.6
Grinding wheel diameter, mm:	550	Speed, r.p.m. . . . . 1000
Maximum . . . . .	900	Coolant pump (two motors):
Minimum . . . . .	450	Power, kW . . . . . 0.65
Headstock and Footstock		Speed, r.p.m. . . . . 3000
Taper hole in headstock and footstock spindles . . . . .	Metric 140	Work head movement:
Maximum movement of footstock spindle, mm . . . . .	150	Power, kW . . . . . 1.0
Speeds and Feeds		Speed, r.p.m. . . . . 1500
Grinding wheel spindle speeds (ininitely variable), r.p.m.:	500	Hydraulic pump:
Minimum . . . . .	1000	Power, kW . . . . . 10
Maximum . . . . .		Speed, r.p.m. . . . . 1500
Work speed (ininitely variable), r.p.m.:		Center grinding attachment:
Minimum . . . . .	6	Power, kW . . . . . 1.0
Maximum . . . . .	40	Speed, r.p.m. . . . . 1000
Space Occupied		Weight
	Floor space, mm . . . . .	approx. 70000
	Height of machine, mm . . . . .	



#### ROLL GRINDING MACHINE

MODEL 3417 B



The 3417 B Roll Grinding Machine is designed for the grinding of large mill rolls with either straight, concaved or crowned bodies.

Parallel or taper roll journals and the adjacent radii from 5 to 50 mm may also be ground in this machine.

The machine is of the moving wheel head type in which the grinding wheel is traversed up and down the length of the roll, which is rotated but does not move lengthwise.

The three fundamental motions — the work revolving movement, the grinding wheel and the grinding saddle traverse — each have an independent variable stepless drive from D. C. motors.

The wheel head traverse speed and the number of revolutions in minute of both the work and grinding wheel are indicated by special instruments on the control panel.

The machine is equipped with a center grinding attachment which is driven by a separate motor.

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**SPECIFICATIONS****Capacity**

Height of centers over bed, mm  
Maximum length of work ground mm  
Diameter of work ground, mm  
Maximum, with 600 mm diameter wheel . . . . .  
Minimum, with 900 mm diameter wheel . . . . .  
Maximum work with or crown machine will grind, mm  
Maximum length of taper ground, mm  
Maximum weight machine will carry, kg

	Grinding saddle traverse speeds (infinitely variable), r.p.m.:
800	Minimum . . . . . 0.05
6000	Maximum . . . . . 2.5
	Wheel head cross feed, over one tooth of ratchet, mm . . . . . 0.005
	<b>Drive</b>
1500	D. C. electric motors:
200	Grinding wheel:
	Power, kW . . . . . 29
1	Speeds, r.p.m. . . . . 500—1000
500	Work revolving mechanism:
	Power, kW . . . . . 64
40000	Speeds, r.p.m. . . . . 200—1925
	Grinding saddle traverse:
220/380 volt, 3 phase, 50 cycle	Power, kW . . . . . 5.6
A. C. motor:	Speeds, r.p.m. . . . . 20—1000
6000	Footstock travel:
	Power, kW . . . . . 1.7
1	Speed, r.p.m. . . . . 1000
550	Wheel head cross feed:
	Power, kW . . . . . 1.0
	Speed, r.p.m. . . . . 1500
900	Fan drive:
450	Power, kW . . . . . 1.0
	Speed, r.p.m. . . . . 1500
	Centrifugal pump (two motors):
	Power, kW . . . . . 0.65
	Speed, r.p.m. . . . . 3000
140	Hydraulic pump:
	Power, kW . . . . . 1.0
985	Speed, r.p.m. . . . . 1500
	Center grinding attachment:
	Power, kW . . . . . 1.0
	Speed, r.p.m. . . . . 1000
	<b>Space Occupied</b>
500	Floor space, mm . . . . . 13500 × 4700
1000	Height of machine, mm . . . . . 2500
	<b>Weight</b>
6	Net weight, kg . . . . . approx. 90000

**Headstock and Footstock**

Taper hole in headstock and footstock spindles . . . . . Metric 140  
Diameter of headstock face plate, mm . . . . . 985

	Grinding wheel spindle speeds (infinitely variable), r.p.m.:
500	Maximum . . . . . 1000
	Working speeds (infinitely variable), r.p.m.:
6	Minimum . . . . .
	Maximum . . . . .

**Speeds and Feeds**

Grinding wheel spindle speeds (infinitely variable), r.p.m.  
Maximum . . . . .  
Working speeds (infinitely variable), r.p.m.  
Minimum . . . . .  
Maximum . . . . .

**HYDRAULIC CRANKPIN GRINDING MACHINE**

MODEL 3A421



The 3A421 Hydraulic Crankpin Grinding Machine is designed for the rapid production grinding of automotive crankpins at the plants of mass production. The machine is delivered set-up for grinding the pins of a certain crankshaft. The crankshaft to be ground is held in special chucks, mounted on the spindles of the right and left work heads.

Hydraulic power is utilized to a considerable extent as it operates the rapid advance and withdrawal of the wheel, cross feed of wheel head, traverses the work table, operates the work clamping, work rest shoes, etc. Hand movement of table is also provided.

The work is clamped mechanically by means of powerful springs acting through a system of levers. The machine is provided with interlock mechanisms which prevent damage to machine if operator through error fails to follow proper sequence of lever operation.

The measuring of the ground pin diameter is performed during the operation by a special dial indicator device.

The machine is equipped with five motors.

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**SPECIFICATIONS**

<b>Capacity</b>	<b>Speeds</b>		
Height of centers over table, mm	Work spindle speed, r.p.m.	70	
255	Table traverse speed (hydraulic), m/min.	3—4	
450			
1100			
<b>Drive</b>			
40	220/380 volt, 3 phase, 50 cycle		
80	A.C. motor, r.p.m.		
	Wheel head:		
	Power, kW . . . . .	20	
	Speed, r.p.m. . . . .	1000	
400	Work head:		
	Power, kW . . . . .	1.7	
600	Speed, r.p.m. . . . .	1000	
	Hydraulic pump:		
	Power, kW . . . . .	1.7	
900	Speed, r.p.m. . . . .	1000	
	Coolant pump:		
	Power, kW . . . . .	0.15	
	Speed, r.p.m. . . . .	3000	
<b>Table</b>			
Maximum table traverse (hydraulic and by hand), mm . . . . .			
<b>Wheel Head</b>			
Maximum gross travel of wheel head, mm:			
Manual . . . . .			
Hydraulic (advance) . . . . .			
Grinding wheel dimensions, mm:			
Minimum diameter . . . . .	Space Occupied		
750	Floor space, mm . . . . .	4480 × 2725	
Maximum diameter . . . . .	Height of machine, mm . . . . .	1625	
Face . . . . . according to set-up			
Hole diameter . . . . .	<b>Weight</b>		
305	Net weight, kg . . . . .	approx. 9200	



## **HEAVY DUTY CRANKPIN GRINDING MACHINE**

MODEL 3428



The 3428 Crankpin Grinding Machine has been designed for the grinding of crankpins of heavy engine and diesel crankshafts. The machine is delivered set-up for grinding the pins of a certain crankshaft. To set up the machine for grinding another type of crankshaft it is necessary to change the work head chucks and to reset the center steadyrest for the center main bearing. Each work head may be moved longitudinally on the top of the work table and crankshafts of varying lengths may as a consequence be ground on the same machine.

Rapid movement of the wheel head toward or away from the work and fine feed during the actual grinding are performed hydraulically. Two D.C. motors are provided: one for traversing the work table and the other for driving the work heads giving an infinite number of work speeds ranging from 10 to 30 r.p.m. Grinding up to a stop with wheel head setting to compensate for wheel wear may be performed in this machine.

**SPECIFICATIONS**

<b>Capacity</b>	<b>Diameter that can be ground (in steadyrest), mm:</b>		
Maximum work swing, mm . . . . .	1220	Minimum . . . . .	150
Length of crankshaft, mm:	2000	Maximum . . . . .	300
Minimum . . . . .	5500		
Distance between work and wheel centers, mm:			
Minimum . . . . .	575	Maximum table traverse, mm . . . . .	4300
Maximum . . . . .	1150	Table travel per 1 revolution of hand wheel, mm . . . . .	5

СТАНКОИМПОРТ

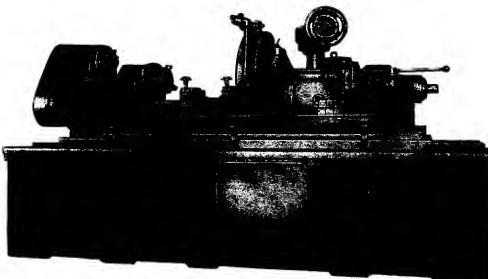
СТАНКОИМПОРТ

Wheel Head			
Maximum cross travel of wheel head:			
By hand . . . . .	200	Hydraulic pump:	
Hydraulically (advance)	350	Power, kW . . . . .	2.8
Grinding wheel dimensions, mm:		Speed, r.p.m. . . . .	1500
Minimum diameter . .	1280	Coolant pump:	
Maximum diameter . .	1400	Power, kW . . . . .	0.65
Face . . . . .	75	Speed, r.p.m. . . . .	3000
Speeds			
Infinitely variable work speeds, r.p.m. . . . . from 10 to 30		Lubricating pump:	
Mechanical table traverse speeds, m/min.:		Power, kW . . . . .	0.25
Minimum . . . . .	0.1	Speed, r.p.m. . . . .	1500
Maximum . . . . .	2.5	D.C. motors:	
Drive		Work head (two motors):	
220/380 volt, 3 phase, 50 cycle		Power, kW . . . . .	6.5
A.C. motors:		Speed, r.p.m. . . . .	500—1500
Wheel head:		Table traverse:	
Power, kW . . . . .	28	Power, kW . . . . .	1.6
Speed, r.p.m. . . . .	750	Speeds, r.p.m. . . . .	40—1000
Weight			
Floor space, mm . . . . .	15500 × 4000	Space Occupied	
Height of machine, mm . . . . .	2550	Floor space, mm . . . . .	15500 × 4000
Net weight, kg . . . . . approx. 55000		Height of machine, mm . . . . .	2550



## CRANKSHAFT REGRINDING MACHINE

MODEL 3420



The 3420 Crankshaft Regrinding Machine is designed for regressing both pins and line bearings of automotive crankshafts. It may also be used for plain cylindrical grinding of many other automotive parts.

While regressing pins the crankshaft is held in chucks mounted on the headstock and footstock spindles. The chucks and balance weights are mounted on slides, the positions of which are adjustable in order that the required off-center distance may be secured when grinding pins of different crankshafts.

When regressing line bearings the crankshaft is held in centers. Power from the motor to the work spindle is transmitted by means of a belt drive with three-step pulleys.

The longitudinal movement of the table and the cross movement of the wheel head are performed manually.

A wheel truing device, equipment for horizontal and vertical adjustment of the crankshaft to be ground and a work drive dog for center grinding are supplied with the machine.

The machine is equipped with three motors.

СТАНКОИМПОРТ

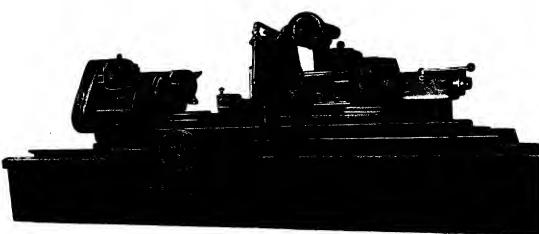
СТАНКОИМПОРТ

**SPECIFICATIONS**

<b>Capacity</b>		<b>Maximum face . . . . .</b>	<b>44</b>
Height of centers, mm	215	Hole diameter . . . . .	305
Distance between centers, mm	1100		
Distance between wheel and work centers, mm:			
Minimum . . . . .	240	<b>Speeds</b>	
Maximum . . . . .	480		
Diameter of pin which can be ground (in steadyrest), mm:		Work speeds, r. p. m. . . . .	40; 75; 140
Minimum . . . . .	30		
Maximum . . . . .	90	<b>Drive</b>	
Maximum length of work, mm	1100	220/380 volt, 3 phase, 50 cycle	
Maximum weight of work, kg	80	A. C. motors:	
		Work head:	
		Power, kW . . . . .	7.0
		Speed, r. p. m. . . . .	1500
		Headstock:	
		Power, kW . . . . .	1.0
		Speed, r. p. m. . . . .	1000
		Coolant pump:	
		Power, kW . . . . .	0.125
		Speed, r. p. m. . . . .	3000
<b>Table</b>			
Maximum table travel (by hand), mm . . . . .	1100	<b>Space Occupied</b>	
		Floor space, mm . . . . .	2800 × 1700
		Height of machine, mm . . . . .	1600
<b>Wheel Head</b>			
Maximum cross travel of wheel head, mm . . . . .	240	<b>Weight</b>	
Grinding wheel dimensions, mm:			
Minimum diameter . . . . .	480	Net weight, kg . . . . .	approx. 4200
Maximum diameter . . . . .	750		
Minimum face . . . . .	33		

**CRANKSHAFT REGRINDING MACHINE**

MODEL 3423



The 3423 Crankshaft Regrinding Machine is designed for regressing both pins and line bearings of automotive crankshafts. It may also be used for plain cylindrical grinding of many other automotive parts. While regressing pins the crankshaft is held in chucks mounted on the headstock and footstock spindles. The chucks and balance weights are mounted on slides, the positions of which are adjustable in order that the required off-center distance may be secured when grinding pins of different crankshafts. When regressing line bearings the crankshaft is held in centers.

Power from the motor to the work spindle is transmitted by means of a belt drive with three-step pulleys.

The longitudinal movement of the table and the cross movement of the wheel head are performed manually.

The swiveling table permits grinding of tapered surfaces.

A wheel truing device, equipment for horizontal and vertical adjustment of the crankshaft to be ground and a work drive dog for center grinding are supplied with the machine.

The machine is equipped with three motors.

СТАНКОИМПОРТ

СТАНКОИМПОРТ

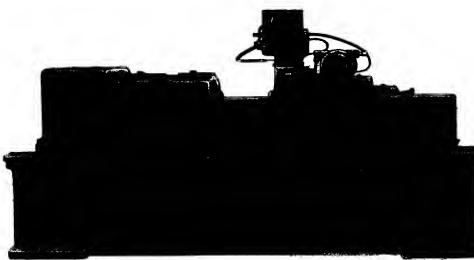
**SPECIFICATIONS**

<b>Capacity</b>			
Height of centers, mm . . . . .	300	Minimum face . . . . .	33
Distance between centers, mm . . . . .	1600	Maximum face . . . . .	40
Distance between wheel and work centers, mm:		Hole diameter . . . . .	305
Minimum . . . . .	275		
Maximum . . . . .	595	Work speeds, r.p.m. . . . .	30, 65; 115
Diameter that can be ground (in steelyre), mm:			
Minimum . . . . .	30	Drive	
Maximum . . . . .	100	220/380 volt, 3 phase, 50 cycle	
Maximum crankshaft throw, mm . . . . .	110	A. C. motors:	
Maximum length of work, mm . . . . .	1600	Power, kW . . . . .	7.0
Maximum weight of work, kg . . . . .	125	Speed, r.p.m. . . . .	1000
Table		Headstock:	
Maximum table travel, mm . . . . .	320	Power, kW . . . . .	1.0
Maximum swivel of table, degrees . . . . .		Speed, r.p.m. . . . .	1000
Wheel Head		Coolant pump:	
Maximum cross travel of wheel head, mm . . . . .	550	Power, kW . . . . .	0.125
Grinding wheel dimensions, mm:		Speed, r.p.m. . . . .	3000
Minimum diameter . . . . .	300		
Maximum diameter . . . . .	900	Space Occupied	
		Floor space, mm . . . . .	3930 × 1795
		Height of machine, mm . . . . .	1620
		Weight	
		Net weight, kg . . . . .	approx. 6000



## AUTOMATIC HYDRAULIC CAM GRINDING MACHINE

MODEL XIII-170



The XIII-170 Cam Grinder is a hydraulically operated automatic machine for rough and finish grinding the cam contours of automotive engine camshafts at plants of mass production. The cycle of operation is automatic although the machine may be manually operated. With a camshaft in place the operator presses a button and moves a lever which starts the machine's automatic functions.

The machine can be stopped at any time during the cycle and any particular cam on the shaft can be ground independently of the others if desired.

The following automatic functions of the machine during the cycle of operation are controlled hydraulically: shifting the table to bring the next cam into position for grinding, locking the table, swinging the cradle into the forward inoperative position, disengagement of table hand movement mechanism, rapid movement of the wheel head toward or away from the work and fine feed during the actual grinding, wheel truing and wheel head setting to compensate for wheel wear, stopping the grinding wheel reciprocation, interlocking the starting lever during the wheel truing.

A two-speed motor drives the work.

СТАНКОИМПОРТ

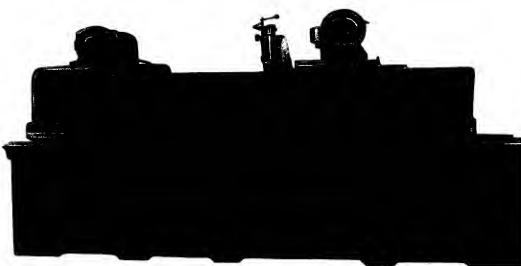
СТАНКОИМПОРТ

**SPECIFICATIONS**

<b>Capacity</b>		<b>Speeds</b>	
Height of centers over cradle, mm	75	Minimum face . . . . .	25
Distance between centers, mm	900	Maximum face . . . . .	40
Distance between wheel and work centers, mm:		Hole diameter . . . . .	305
Minimum . . . . .	260	Work speeds, r. p.m. . . . .	30: 60
Maximum . . . . .	360		
Maximum radius of rotation, mm	60	<b>Drive</b>	
Maximum lift of cam, mm	15	220:380 volt, 3 phase, 50 cycle	
Diameter that can be ground (in steadyrest), mm:		A.C. motors:	
Minimum . . . . .	20	Wheel head:	
Maximum . . . . .	60	Power, kW . . . . .	7
Maximum weight of work, kg	30	Speed, r.p.m. . . . .	1500
<b>Table, Headstock and Footstock</b>		Headstock (two-speed):	
Maximum traverse of table (hydraulic and manual), mm	900	Power, kW . . . . .	1.7/2.0
Taper hole in headstock and footstock spindles . . . . .	Morse No. 4	Speeds, r.p.m. . . . .	1500/3000
<b>Wheel Head</b>		Hydraulic pump:	
Maximum cross travel of wheel head, mm:		Power, kW . . . . .	2.8
Manual . . . . .	120	Speed, r.p.m. . . . .	1500
Hydraulic (advance) . . . . .	14	Coolant pump:	
Grinding wheel dimensions, mm:		Power, kW . . . . .	0.125
Minimum diameter . . . . .	500	Speed, r.p.m. . . . .	3000
Maximum diameter . . . . .	600	<b>Space Occupied</b>	
		Floor space, mm . . . . .	3200 × 2275
		Height of machine, mm . . . . .	1740
		<b>Weight</b>	
		Net weight, kg . . . . .	approx. 7000

**CAMSHAFT REGRINDING MACHINE**

MODEL 3433



The 3433 Camshaft Regrinding Machine is designed for regrinding the cam contours of automotive camshafts. The cam grinding is performed by the copying method. The contour is produced by swinging the work as it revolves, toward and away from the grinding wheel, by means of a master cam in contact with a roller.

Various types and kinds of cam shapes can be ground in this machine using a set of interchangeable master cam blocks furnished with the machine and mounted on the headstock spindle. A master block consists of a master exhaust cam, a master inlet cam and an eccentric (in case the camshaft has such an eccentric). The longitudinal movement of the table and the cross movement of the wheel head are performed manually.

Power from the motor to the work spindle is transmitted by means of a belt drive with two-step pulleys.

СТАНКОИМПОРТ

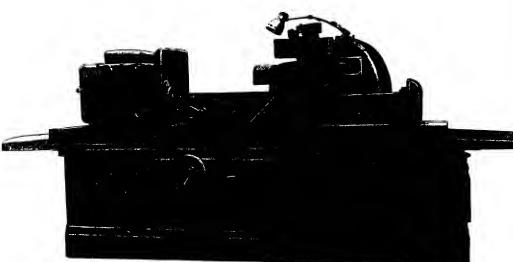
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**SPECIFICATIONS**

<b>Capacity</b>			
Height of centers over cradle, mm	95	Maximum diameter . . . . .	600
Distance between centers, mm	1260	Minimum face . . . . .	25
Diameter between wheel and work centers, mm:		Maximum face . . . . .	40
Minimum . . . . .	280	Hole diameter . . . . .	305
Maximum . . . . .	500		
Maximum radius of rotation, mm	90	<b>Speeds</b>	
Maximum lift of cam, mm	15	Work speeds, r.p.m. . . . .	16; 32
Diameter that can be ground (in steady state), mm:			
Minimum . . . . .	30	220/380 volt, 3 phase, 50 cycle	
Maximum . . . . .	75	A.C. motors:	
Maximum weight of work, kg	30	Wheel head:	
		Power, kW . . . . .	4.3
<b>Table, Headstock and Footstock</b>		Speed, r.p.m. . . . .	1500
Maximum traverse of table (by hand), mm	1280	Headstock:	
Taper hole in headstock and footstock spindles . . . . .	Morse No. 4	Power, kW . . . . .	0.7
		Speed, r.p.m. . . . .	1000
<b>Wheel Head</b>		Coolant pump:	
Maximum cross travel of wheel head (by hand), mm	240	Power, kW . . . . .	0.125
Grinding wheel dimensions, mm:		Speed, r.p.m. . . . .	3000
Minimum diameter . . . . .	500	<b>Space Occupied</b>	
		Floor space, mm . . . . .	2800 × 1860
		Height of machine, mm . . . . .	1500
		<b>Weight</b>	
		Net weight, kg . . . . .	approx. 4200

**SPINE GRINDING MACHINE**

MODEL 345 A



The 345 A Spline Grinder is designed for accurate and fine finish grinding of every type of spline shaft in both small and large quantities.

The working cycle of the machine includes: hydraulic table traverse, indexing of spline shaft at end of table traverse, rough grinding, down feed of grinding wheel at end of each complete revolution of work, truing of grinding wheel, changing table traverse speed for finish grinding, changing rough feed of grinding wheel to finish feed and stopping machine when final size of splines is reached.

The machine is equipped with four electric motors.

**SPECIFICATIONS**

<b>Capacity</b>			
Height of centers, mm . . . . .	210	Maximum length ground, mm	800
Distance between centers, mm	1000	Number of splines ground	4; 6; 8; 12; 16
Diameter of work ground, mm:			
Minimum . . . . .	28	<b>Wheel Head</b>	
Maximum . . . . .	120	Maximum travel of wheel head, mm:	
		Horizontal . . . . .	40
		Vertical . . . . .	125

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Grinding wheel dimensions,  
mm:

Minimum and maximum diameter . . . . .	75—200
Minimum and maximum width . . . . .	10—25
Hole . . . . .	32

**Table**

Working surface of table, mm 2320 × 300

Maximum table traverse, mm 1100

**Drive**  
220/380 volt, 3 phase, 50 cycle

A.C. motors:	
Grinding wheel drive:	
Power, kW . . . . .	2.8
Speed, r.p.m. . . . .	3000
Hydraulic pump:	
Power, kW . . . . .	4.5
Speed, r.p.m. . . . .	1000
1/2 hp hydraulic motor:	
Power, kW . . . . .	0.6
Speed, r.p.m. . . . .	1500
Coolant pump:	
Power, kW . . . . .	0.125
Speed, r.p.m. . . . .	3000

**Speeds and Feeds**Grinding wheel speeds, r.p.m. 2850; 4300;  
5700**Space Occupied**

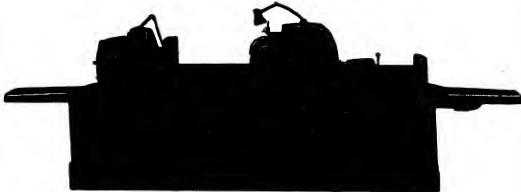
Floor space, mm . . . . .	4500 × 1425
Height of machine, mm . . . . .	1765

**Weight**

Range of grinding wheel feeds (by hand), mm per revolution of work . . . . .	0.005—0.1
Net weight, kg . . . . .	approx. 8000

**SPINE GRINDING MACHINE**

MODEL 3451 A



The 3451 A Spline Grinder is designed for accurate and fine finish grinding of every type of spline shaft in both small and large quantities.

The working cycle of the machine includes: hydraulic table traverse, indexing of spline shaft at end of table traverse, rough grinding, down feed of grinding wheel at end of each complete revolution of work, truing of grinding wheel, changing table traverse speed for finish grinding, changing rough feed of grinding wheel to finish feed and stopping machine when final size of splines is reached.

The machine is equipped with four electric motors.

**SPECIFICATIONS**

Capacity		40	
Height of centers, mm . . . . .	210	Vertical . . . . .	125
Distance between centers, mm . . . . .	1500	Grinding wheel dimensions, mm:	
Diameter of work ground, mm . . . . .		Minimum and maximum diameter . . . . .	75—200
Minimum . . . . .	28	Minimum and maximum width . . . . .	10—25
Maximum . . . . .	120	Hole . . . . .	32
Maximum length ground, mm . . . . .	1300		
Number of splines ground 4; 6; 8; 12; 16			

**Wheel Head**Maximum travel of wheel  
head, mm:

Working surface of table, mm 2840 × 300

Maximum table traverse, mm 1600

СТАНКОИМПОРТ

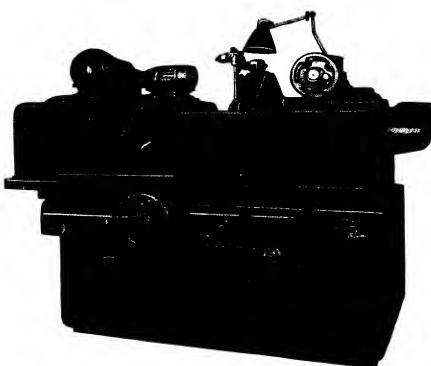
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<b>Speeds and Feeds</b>		<b>Hydraulic pump:</b>	
Grinding wheel speeds, r.p.m.	2850; 4300;	Power, kW . . . . .	4.5
Table traverse speeds (infinitely variable), m/min.	3700	Speed, r.p.m. . . . .	1000
<b>Indexing mechanism:</b>		<b>Constant pressure:</b>	
Minimum	2	Power, kW . . . . .	0.6
Maximum	20	Speed, r.p.m. . . . .	1500
<b>Constant pressure:</b>		<b>Copyant pump:</b>	
Range of grinding wheel feeds (by hand), mm per revolution of work	0.005—0.1	Power, kW . . . . .	0.125
<b>Space Occupied</b>		Speed, r.p.m. . . . .	3000
<b>Drive</b>		Floor space, mm . . . . .	6000 × 1425
220/380 volt, 3 phase, 50 cycle		Height of machine, mm . . . . .	1765
<b>A.C. motors:</b>		<b>Weight</b>	
Grinding wheel drive:			
Power, kW . . . . .	2.8		
Speed, r.p.m. . . . .	3000	Net weight, kg . . . . .	approx. 6300



## DISC CAMS GRINDING MACHINE

MODEL XIII-81



The XIII-81 Grinding Machine is designed for grinding the contour on disc cams.

The machine employs the copying method. The master cam is mounted on the front part of the work head spindle. For each type of cam a special master cam is necessary. The workpiece to be ground is mounted on a special arbor and fastened, and is inserted into the tapered hole of the work spindle.

Approach and withdrawal of the wheel head, approach and withdrawal of the headstock with the spindle and master cam from the roller support, slow in-feed of the wheel head (plunge-cut) are effected hydraulically.

Another feature of the machine is that it can be arranged to grind to a pre-set limit and then withdrawing the wheel head the accurate size of the workpiece has been ensured.

СТАНКОИМПОРТ

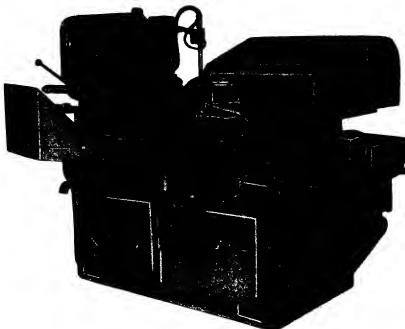
СТАНКОИМПОРТ

The wheel head spindle has oscillating motion, which can be disengaged when the wheel is being dressed.  
The machine is furnished with a special device by the help of which worn-out master cams can be reground.



## INTERNAL AUTOMATIC BALL RACE GRINDER

MODEL ІЛ 3-5 М



## SPECIFICATIONS

Capacity		Speeds	
Maximum diameter of work, mm	400	Work spindle speeds, r.p.m.	12; 24
Distance between wheel and work center (without hydraulic withdrawal), mm		Drive	
Minimum . . . . .	285	220/380 volt, 3 phase, 50 cycle	
Maximum . . . . .	485	electrical motors:	
Maximum diameter of work ground, mm	250	Wheel head:	
Maximum lift of cam ground, mm	30	Power, kW . . . . .	7
Maximum length ground, mm	50	Speed, r.p.m. . . . .	1500
Table and Work Head		Work head:	
Maximum longitudinal travel of table (by hand), mm	300	Power, kW . . . . .	1.0
Taper hole in work head	Morse No. 6	Speed, r.p.m. . . . .	1000
Wheel Head		Hose pump:	
Maximum travel of wheel head, mm:		Power, kW . . . . .	2.8
By hand . . . . .	150	Speed, r.p.m. . . . .	1500
Hydraulic (approach) . . . . .	50	Coolant pump:	
Grinding wheel dimensions, mm:		Power, kW . . . . .	0.125
Minimum diameter . . . . .	500	Speed, r.p.m. . . . .	3000
Maximum diameter . . . . .	600		
Face . . . . .	50		
Hole diameter . . . . .	305	Space Occupied	
		Floor space, mm . . . . .	1900 × 1950
		Height of machine, mm . . . . .	1550
		Weight	
		Net weight, kg . . . . .	approx. 4200

The IL 3-5 M Ball Race Grinder is designed for grinding ball race-ways in external ball bearing rings.

Grinding is based upon the principle of oscillation of the workpiece. The working cycle is controlled by means of an electrical sizing device, which changes the feed, shows the progress of the grinding wheel in removing stock and indicates the completion of the operational sizing. It then withdraws the wheel head and stops all electric motors, except that of the wheel head.

СТАНКОИМПОРТ

СТАНКОИМПОРТ

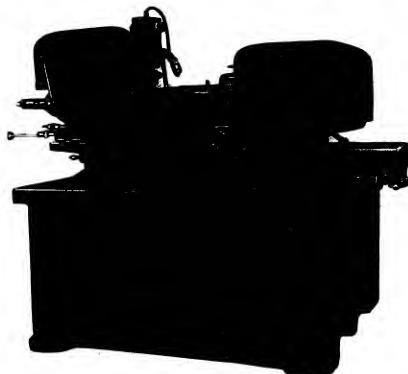
**SPECIFICATIONS**

<b>Capacity</b>		<b>Drive</b>
Diameter of external ring ground, mm		220/380 volt, 3 phase, 50 cycle
Maximum . . . . .	200	A.C. motor:
Minimum . . . . .	90	Grinding wheel:
Maximum radius of ball race-way ground, mm	100	Power, kW . . . . . 2.8 Speed, r.p.m. . . . . 3000
<b>Wheel Head</b>		Rapid approach:
Longitudinal rapid power approach, mm	100	Power, kW . . . . . 0.65 Speed, r.p.m. . . . . 1500
Cross rapid power approach, mm	20	Oscillating drive:
Grinding wheel speeds, r.p.m.	5600 and 9000	Power, kW . . . . . 1.0 Speed, r.p.m. . . . . 1500
Range of feeds, mm/min.	0.15—2.4	Feed drive:
		Power, kW . . . . . 0.125 Speed, r.p.m. . . . . 3000
<b>Table</b>		
Number of complete oscillations per min.	18 and 30	<b>Space Occupied</b>
Maximum swivel angle . . . . .	60°	Floor space, mm . . . . . 1885 × 1285 Height of machine, mm . . . . . 1500
<b>Work Head</b>		
Speeds of work, r.p.m. . . . .	200 and 300	<b>Weight</b>
		Net weight, kg . . . . . approx. 2500



## **INTERNAL AUTOMATIC BALL RACE GRINDER**

MODEL ІЛ 3-8 М



The IL 3-8 M Ball Race Grinder is designed for grinding ball race-ways in external ball bearing rings.

The working cycle of the machine is completely independent of the operator, which makes it possible for one operator to work on several machines.

The automatic cycle of the machine is controlled by means of an electrical sizing device through changes in the size of the race-way being ground.

**СТАНКОИМПОРТ**

**СТАНКОИМПОРТ**

**SPECIFICATIONS**

<b>Capacity</b>	<b>Drive</b>
Diameter of external ring ground, mm:	220/380 volt, 3 phase, 50 cycle
Maximum . . . . .	A.C. motors:
Minimum . . . . .	Grinding wheel:
Maximum radius of ball race-way ground, mm . . . . .	Power, kW . . . . .
Maximum . . . . .	Speed, r.p.m. . . . .
Minimum . . . . .	Speed, r.p.m. . . . .
Maximum . . . . .	Rotation of work:
Minimum . . . . .	Power, kW . . . . .
Maximum . . . . .	Speed, r.p.m. . . . .
Wheel Head	Rapid approach:
Longitudinal rapid power approach, mm . . . . .	Power, kW . . . . .
Cross rapid power approach, mm . . . . .	Speed, r.p.m. . . . .
Grinding wheel speeds, r.p.m. . . . .	Oscillating drive:
9000 and 16000 . . . . .	Power, kW . . . . .
Range of feeds, mm/min. . . . .	Speed, r.p.m. . . . .
0.15—2.4 . . . . .	Feed drive:
Power, kW . . . . .	Power, kW . . . . .
Speed, r.p.m. . . . .	Speed, r.p.m. . . . .
Table	<b>Space Occupied</b>
Number of complete oscillations per min. . . . .	Floor space, mm . . . . .
Maximum swivel angle . . . . .	Height of machine, mm . . . . .
Work Head	<b>Weight</b>
Speeds of work, r.p.m. . . . .	Net weight, kg . . . . .



## **EXTERNAL AUTOMATIC BALL RACE GRINDER**

MODEL **Л 3-9 М**



The Л 3-9 М Ball Race Grinder is designed for grinding ball race-ways on internal ball bearing rings.

The working cycle of the machine is completely independent of the operator, which makes it possible for one operator to work on several machines.

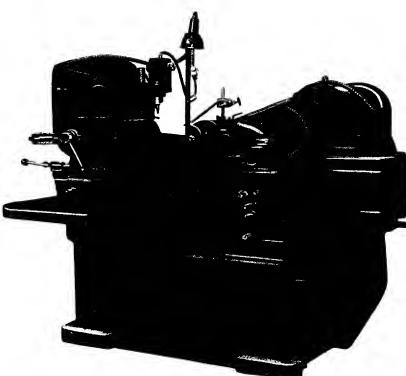
The automatic cycle of the machine is controlled by means of an electrical sizing device through changes in the size of the race-way being ground.

**СТАНКОИМПОРТ**

**СТАНКОИМПОРТ**

**SPECIFICATIONS**

<b>Capacity</b>	<b>Drive</b>	
Diameter of internal ring ground, mm:	220/380 volt, 3 phase, 50 cycle	
Maximum . . . . .	140	A.C. motor:
Minimum . . . . .	40	Grinding wheel:
Maximum radius of race-way ground, mm . . . . .	20	Power, kW . . . . . 2.8 Speed, r.p.m. . . . . 1500 Rotation of work:
Maximum . . . . .	1450	Power, kW . . . . . 0.65 Speed, r.p.m. . . . . 1500
Range of feed, mm/min. . . . .	0.15—2.4	Rapid approach:
Wheel Head		Power, kW . . . . . 1.0 Speed, r.p.m. . . . . 1000
Longitudinal rapid power approach, mm/min. . . . .	85	Oscillating drive:
Grinding wheel speed, r.p.m. . . . .	1450	Power, kW . . . . . 1.0 Speed, r.p.m. . . . . 1500
Range of feed, mm/min. . . . .	0.15—2.4	Feed drive:
Table		Power, kW . . . . . 0.125 Speed, r.p.m. . . . . 3000
Number of complete oscillations, per min. . . . .	30: 40: 50	<b>Space Occupied</b>
Maximum swivel angle . . . . .	60°	Floor space, mm . . . . . 1600 × 1490 Height of machine, mm . . . . . 1580
Work Head		<b>Weight</b>
Speeds of work, r.p.m. . . . .	290 and 540	Net weight, kg . . . . . approx. 2100

**AUTOMATIC BALL RACE GRINDER**MODEL **Л3-10 М**

The Л3-10 М Ball Race Grinder is designed for grinding ball race-ways of ball thrust bearings. The working cycle, which consists of rough and finish grinding to size, is completely automatic. This makes it possible for one operator to work on several machines.

The automatic cycle of the machine is controlled by means of an electrical sizing device, which actuates the necessary mechanisms in the process of the grinding operation.

СТАНКОИМПОРТ

СТАНКОИМПОРТ

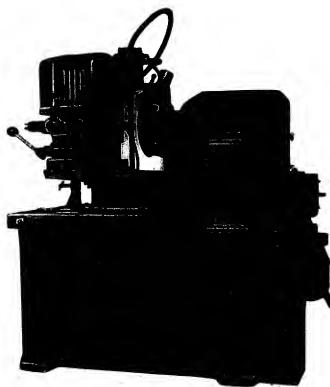
**SPECIFICATIONS**

<b>Capacity</b>	<b>Drive</b>
Maximum outside diameter of bearing washer ground, mm	220/380 volt, 3 phase, 50 cycle
350	A.C. motors:
Minimum inside diameter of bearing washer ground, mm	Grinding wheel: Power, kW . . . . . 2.8 Speed, r.p.m. . . . . 3000
120	Grinding drive: Power, kW . . . . . 1.0 Speed, r.p.m. . . . . 1500
	Rotation of work: Power, kW . . . . . 0.65 Speed, r.p.m. . . . . 1500
	Rapid approach: Power, kW . . . . . 1.0 Speed, r.p.m. . . . . 1500
	Feed drive: Power, kW . . . . . 0.125 Speed, r.p.m. . . . . 3000
	<b>Table</b>
Number of complete oscillations per min. . . . . 18 and 30	<b>Space Occupied</b>
Maximum swivel angle . . . . . 50°	Floor space, mm . . . . . 1900 × 1285 Height of machine, mm . . . . . 1550
	<b>Work Head</b>
Speeds of work, r.p.m. . . . . 150 and 300	<b>Weight</b>
	Net weight, kg . . . . . approx. 3150



## **EXTERNAL AUTOMATIC BALL RACE GRINDER**

MODEL Л3-26



The Л3-26 Ball Race Grinder is designed for grinding ball race-ways on internal ball bearing rings.

The working cycle of the machine is completely independent of the operator, which makes it possible for one operator to work on several machines.

The automatic cycle of the machine is controlled by means of an electrical sizing device through changes in the size of the race-way being ground.

**СТАНКОИМПОРТ**

**СТАНКОИМПОРТ**

**SPECIFICATIONS**

<b>Capacity</b>	<b>Drive</b>		
Diameter of internal ring ground, mm:	220/380 volt, 3 phase, 50 cycle		
Maximum . . . . .	40	A.C. motors:	
Minimum . . . . .	10	Grinding wheel:	
Maximum radius of race-way ground, mm . . . . .	10	Power, kW . . . . .	1.7
		Speed, r.p.m. . . . .	3000
		Oscillating drive:	
		Power, kW . . . . .	1.0
		Speed, r.p.m. . . . .	1500
		Rapid approach:	
		Power, kW . . . . .	1.0
		Speed, r.p.m. . . . .	1000
<b>Wheel Head</b>		Power at work:	
Rapid approach, mm . . . . .	85	Power, kW . . . . .	0.6
Grinding wheel speed, r.p.m. . . . .	2100	Speed, r.p.m. . . . .	1500
Range of feeds, mm/min. . . . .	0.15—2.4	Feed drive:	
		Power, kW . . . . .	0.1
		Speed, r.p.m. . . . .	3000
<b>Space Occupied</b>			
<b>Table</b>			
Number of complete oscillations per min. . . . .	30 and 50	Floor space, mm . . . . .	1470 × 1345
Maximum swivel angle . . . . .	60°	Height of machine, mm . . . . .	1440

**Weight**

Net weight, kg . . . . . approx. 2000



## **BEARING RACE SUPERFINISHING MACHINE**

**MODEL ІІ 3-15 М**

The II 3-15 M Bearing Race Superfinishing Machine is designed for super-finishing the race-ways of external and internal rings of roller bearings. Super-finishing is carried out with abrasive sticks held in a special holder. The sticks oscillate along the generatrix of the race-way of the work, while the latter revolves about its axis.

**СТАНКОИМПОРТ****СТАНКОИМПОРТ**

**SPECIFICATIONS****Capacity**

Diameter of external ring to be machined, mm:  
Minimum . . . . . 50  
Maximum . . . . . 175

220/380 volt, 3 phase, 50 cycle  
A.C. motors  
Work head (two speed):  
Power, kW . . . . . 0.7/1.2  
Speeds, r.p.m. . . . . 750/1500

Diameter of internal ring to be machined, mm:  
Minimum . . . . . 30  
Maximum . . . . . 150

Power, kW . . . . . 0.25  
Speed, r.p.m. . . . . 1500

**Work Head**

Speeds of work, r.p.m.:  
Roughing . . . . . 65; 175; 270; 430  
Finishing . . . . . 130; 350; 540; 860

Power, kW . . . . . 0.41  
Speed, r.p.m. . . . . 3000

**Slide**

Travel of slide, mm . . . . . 390

Power, kW . . . . . 0.15  
Speed, r.p.m. . . . . 3000

**Oscillating Head**

Range of oscillations per min. . . . . 500—1000  
Pressure of abrasive stick, kg . . . . . 2—20  
Amplitude of oscillation, mm:  
For oscillations from 700 to 1000 . . . . . 0—3  
For oscillations from 500 to 700 . . . . . 3—5

Space Occupied  
Floor space, mm . . . . . 1500 x 900  
Height of machine, mm . . . . . 1550

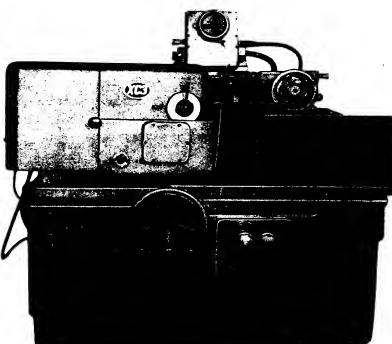
**Weight**

Net weight, kg . . . . . approx. 1600



## **EXTERNAL ROLL RACE GRINDING MACHINE**

**MODEL 3486**



The 3486 Roll Race Grinding Machine is designed for rough and finish grinding race-ways on internal rings of cylindrical and taper roller bearings with inside diameters ranging from 17 to 120 mm.

Rings with bores less than 45 mm are gripped in collet chucks, and those with bores greater than 45 mm are gripped in membrane chucks.

The machine operates upon the plunge-cut principle to a positive stop arrangement.

The work head has angular adjustment for taper grinding.

The working cycle of the machine is semi-automatic.

Rapid power approach and withdrawal of wheel head, rough and finish grinding, dwell, release of work, wheel truing, intermittent in-feed of wheel and diamond dressing are accomplished hydraulically.

**СТАНКОИМПОРТ**

**СТАНКОИМПОРТ**

**SPECIFICATIONS****Capacity**

Maximum diameter of work, mm . . . . .  
 Distance between wheel and work centers (without hydraulic withdrawal), mm:  
     Minimum . . . . .  
     Maximum . . . . .  
 Diameter that can be ground, mm:  
     Maximum . . . . .  
     Minimum . . . . .  
 Maximum length ground, mm . . . . .

Maximum face . . . . .     63  
 Minimum face . . . . .     20  
 Hole diameter . . . . .     305

**Speeds**

Work spindle speeds, r.p.m.     150; 210

220/380 volt, 3 phase, 50 cycle electric motors:

Grinding wheel heads:  
     Power, kW . . . . .     7  
     Speed, r.p.m. . . . . .     1500

Work heads:  
     Power, kW . . . . .     1.1  
     Speed, r.p.m. . . . . .     1500

Hydraulic pump:  
     Power, kW . . . . .     1.7  
     Speed, r.p.m. . . . . .     1500

Coolant pump:  
     Power, kW . . . . .     0.125  
     Speed, r.p.m. . . . . .     3000

**Table and Work Head**

Maximum longitudinal travel of table (by hand), mm . . . . .  
 Maximum swing of work head (on one side) . . . . .

Maximum travel of head, mm:  
     By hand . . . . .  
     Hydraulic (approach) . . . . .

Grinding wheel dimensions, mm:  
     Maximum diameter . . . . .  
     Minimum diameter . . . . .

Space Occupied

Floor space, mm . . . . .     1800 × 1950  
 Height of machine, mm . . . . .     1720

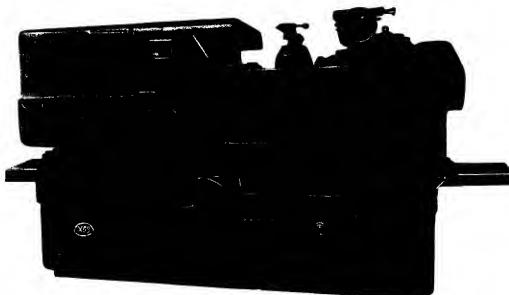
**Weight**

Net weight, kg . . . . .     approx. 4100



## **EXTERNAL ROLLER BEARING RINGS GRINDING MACHINE**

**MODEL 3487 A**



The 3487 A Roller Bearing Rings Grinding Machine is designed for rough and finish grinding race-ways on internal and external rings of cylindrical and taper roller bearings.

The machine has a capacity for grinding rings ranging from 150 to 500 mm in diameter and up to 200 mm in width.

Surface finish and accuracy of work ground are in accordance with both conventional and precision grinding requirements.

The working cycle of the machine is semi-automatic.

The table reciprocating movements are infinitely variable; and the approach (plunge-cut grinding) and withdrawal of the wheel head or the intermittent in-feed of the wheel are effected hydraulically.

**СТАНКОИМПОРТ**

**СТАНКОИМПОРТ**

**SPECIFICATIONS****Capacity**

Maximum diameter of work, mm  
Distance between wheel and work centers (without hydraulic withdrawal), mm:  
Minimum . . . . .  
Maximum . . . . .  
Diameter that can be ground, mm:  
Minimum . . . . .  
Maximum . . . . .  
Maximum length ground, mm  
Maximum weight of ring ground, kg . . . . .

• 600 Minimum face . . . . . 25  
Hole diameter . . . . . 305

**Speeds and Feeds**

Work head spindle speeds, r.p.m.: 50; 75; 100; 150; 300

Table transverse speeds (ininitely variable), m/min.:  
Minimum . . . . . 0.2  
Maximum . . . . . 5

• 300 220/380 volt, 3 phase, 50 cycle

electric motors:

• 500 Wheel head:  
Power, kW . . . . . 14  
Speed, r.p.m. . . . . 1500

Work head: 400 V  
Power, kW . . . . . 1.1/1.35/1.75  
Speeds, r.p.m. . . . . 1000/1500/3000

• 500 Hydraulic pump:  
Power, kW . . . . . 1.7  
Speed, r.p.m. . . . . 1000

• 18 Coolant pump:  
Power, kW . . . . . 0.15  
Speed, r.p.m. . . . . 3000

• 280 Space Occupied  
50 Floor space, mm . . . . . 2760 × 2350  
Height of machine, mm . . . . . 1900

**Weight**

• 600 Net weight, kg . . . . . approx. 6500

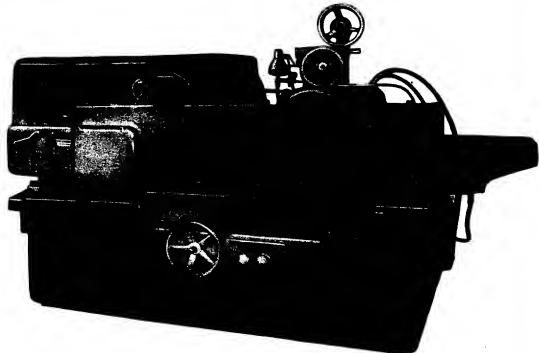
• 400

• 100



## **ROLLER RING SHOULDERS GRINDING MACHINE**

**MODEL 3497**



The 3497 Roller Ring Shoulders Grinding Machine is designed for grinding taper and spherical shoulders on internal rings of taper roller bearings. Power approach and withdrawal of wheel head, working feed of wheel head (plunge-cut grinding), wheel truing, compensation for wheel wear when diamond dressing are effected hydraulically.

The workpiece is both gripped and released by an air-operated chuck.

The machine operating cycle is semi-automatic, and the wheel head is withdrawn when the predetermined, accurate sizing of the work is obtained.

The machine is provided with a special loading device for mounting heavy rings (weighing over 8 kg).

**СТАНКОИМПОРТ**

**СТАНКОИМПОРТ**

When hand feed to the wheel head is employed (when grinding to a positive stop), it is possible to compensate for wheel wear.

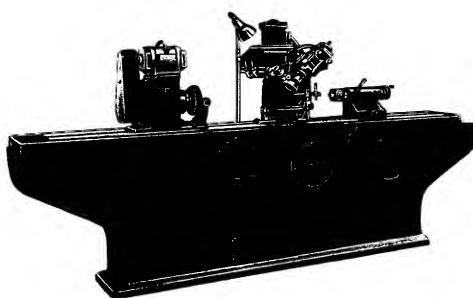
#### SPECIFICATIONS

<b>Capacity</b>		<b>Speeds</b>
Maximum diameter of work, mm	500	Work spindle speeds, r.p.m. . . . . 50: 75: 100: 150: 300
Diameter that can be ground, mm:		
Maximum . . . . .		220/380 volt, 3 phase, 50 cycle
Minimum . . . . .	150	electric motors:
Drive		Wheel head:
Maximum travel of table (by hand), mm . . . . .		Power, kW . . . . . 2.8 Speed, r.p.m. . . . . 1500
Table and Work Head		Work head:
Maximum longitudinal travel of table (by hand), mm . . . . .	500	Power, kW . . . . . 1.1/1.35/1.75 Speeds, r.p.m. . . . . 1000/1500/3000
Wheel Head		Hydraulic pump:
Maximum travel of wheel head, mm:		Power, kW . . . . . 1.0 Speed, r.p.m. . . . . 1000
By hand . . . . .	100	Coolant pump:
Hydraulically (approach) . . . . .	150	Power, kW . . . . . 0.125 Speed, r.p.m. . . . . 3000
Grinding wheel dimensions, mm		<b>Space Occupied</b>
Maximum diameter . . . . .	350	Floor space, mm . . . . . 2870 × 1900
Minimum diameter . . . . .	200	Height of machine, mm . . . . . 1800
Face . . . . .	16	
Hole diameter . . . . .	127	<b>Weight</b>
		Net weight, kg . . . . . approx. 6200



### UNIVERSAL BROACH SHARPENING MACHINE

MODEL 360



The 360 Broach Sharpening Machine is designed for sharpening and regrinding either flat or cylindrical broaches including round, spline, serrated or other types. The machine has been especially developed to assist shops in doing their own broach sharpening by providing a rapid and accurate means of maintaining the same tooth form and cutting effectiveness as are originally provided by the broach maker.

Cylindrical and profile broaches are set in headstock and tailstock centers. Flat broaches are clamped in vices or other clamping fixtures fastened to the machine table. The change-over from round to flat broaches is accomplished quickly and conveniently with a few adjustments and without special tools or equipment.

The tailstock center has a vertical adjustment to set the broach to a desired angle.

СТАНКОИМПОРТ

СТАНКОИМПОРТ

The work table has two manual traverse speeds: the slow table traverse is intended for grinding purposes and the faster traverse for indexing. Universal positioning and movement of the grinding wheel are obtained by the use of a rotatable vertical column, a cross slide mounted on a graduated support and a graduated wheel head mounting.

Convenient handwheels on the front of the machine control the travel of the work table and both vertical and traverse movements of the cross slide.

The swivel head slide and table roll on ball bearings mounted between ways.

A special device is provided for truing the grinding wheel to the desired angle or radius.

The machine is equipped with two motors.

#### SPECIFICATIONS

<b>Capacity</b>		Wheel head:
Maximum length of broach, mm	1500	Power, kW . . . . . 0.65
Maximum diameter of broach, mm	100	Speed, r. p. m. . . . . 3000
Maximum width of flat broach, mm	200	Headstock: Power, kW . . . . . 1.0 Speed, r. p. m. . . . . 1000
<b>Wheel Head</b>		<b>Space Occupied</b>
Grinding wheel swivel in horizontal plane . . . . .	20°	Floor space, mm . . . . . 4085 × 1400 Height of machine, mm . . . . . 1600
<b>Drive</b>		<b>Weight</b>
220/380 volt, 3 phase, 50 cycle A. C. motors:		Net weight, kg . . . . . approx. 1900



## CARBIDE TOOL GRINDING MACHINE

MODEL 3628



The 3628 Tool Grinding Machine is designed for grinding carbide tipped tools.

The machine is provided with two grinding wheels. An adjustable table is located at each wheel provided with both angular and horizontal adjustments.

Angular adjustments is made by hand. Graduated scales are provided at the sides of the tables to enable the operator to set the tables at the required angle. The scale reading is 1°.

Each table is mounted on two slides. The lower slides have a cross movement controlled by hand through nut and screw.

СТАНКОИМПОРТ

СТАНКОИМПОРТ

The longitudinal movement of the top slides along the working surface of the grinding wheels is also controlled by hand.

The machine is provided with a complete wet grinding system. Suitable deep water trays cast integral with the lower slides return the coolant from the work to the water tank.

#### SPECIFICATIONS

Capacity	Drive	
Maximum size of tools ground, mm . . . . .	220/380 volt, 3 phase, 50 cycle A.C. motors:	
30 > 45	Main drive: Power, kW . . . . .	2.8
	Speed, r.p.m. . . . .	1500
	Coolant pump: Power, kW . . . . .	0.125
	Speed, r.p.m. . . . .	3000
Grinding Wheels		Space Occupied
Number of wheels . . . . .	2	Floor space, mm . . . . . 1510 × 1125
Grinding wheel dimensions, mm:		Height of machine, mm . . . . . 1440
Diameter . . . . .	250	
Face . . . . .	150	
Hole diameter . . . . .	100	
Speed of wheel spindle, r.p.m.	1250	Weight Net weight of machine, kg . . . approx. 980



### ELECTRIC EROSION CARBIDE TOOL GRINDER

MODEL 4352



The 4352 Carbide Tool Grinder is designed for sharpening hard alloy tipped tools. Sharpening is accomplished by a steel disc with application of electric current.

The sharpening process is carried out in a special electrolyte by the electric erosion method and comprises: roughing, finishing and lapping operations.

СТАНКОИМПОРТ

СТАНКОИМПОРТ

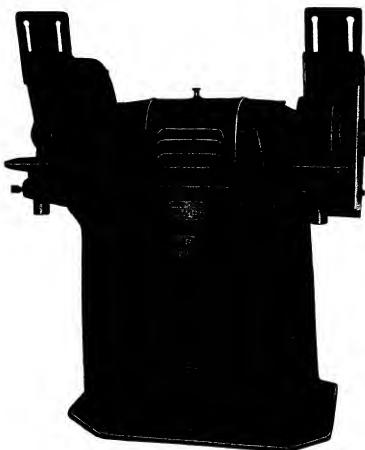
## SPECIFICATIONS

<b>Capacity</b>		<b>Drive</b>
Maximum dimensions of tool sharpened, mm:		220/380 volt, 3 phase, 50 cycle
Minimum . . . . .	10 × 10	A. C. motor drive
Maximum . . . . .	30 × 45	Motor drive
Maximum length of tool, mm . . . . .	315	Power, kW . . . . . 0.65
Distance, axis of spindle to table, mm . . . . .	180	Speed, r.p.m. . . . . 3000
<b>Sharpening disc</b>		Table drive:
Material of sharpening disc . . . . .	Steel 45	Power, kW . . . . . 0.25
Diameter of sharpening disc, mm . . . . .	180	Speed, r.p.m. . . . . 1500
<b>Speeds</b>		Electrolytic pump:
Sharpening disc speeds, r.p.m. . . . .	1230: 1600: 2100	Power, kW . . . . . 0.1
		Speed, r.p.m. . . . . 3000
		Total power required, kW . . . . . approx. 4
		<b>Space Occupied</b>
		Floor space, mm . . . . . 1080 × 870
		Height of machine, mm . . . . . 1460
		<b>Weight</b>
		Net weight, kg . . . . . approx. 850



## **DOUBLE-ENDED DISC GRINDER**

MODEL 3 M 634



The 3 M 634 Double-Ended Disc Grinder is designed for snagging and cleaning castings, forgings, etc. The machine is provided with two tables, one for each wheel.

The wheel spindle is mounted on ball bearings and is driven by a motor housed in the base of the machine through a Vee-belt drive.

The motor is mounted on a plate which is provided with screw adjustment to easily regulate the tension of the Vee-belts used on the drive.

СТАНКОИМПОРТ

СТАНКОИМПОРТ

Truing of the grinding wheels is performed by a dresser mounted in a special device.

Starting and stopping of the machine is through a push-button station mounted on the front of the machine base.

The machine is provided with safety hoods constructed of welded steel plate.

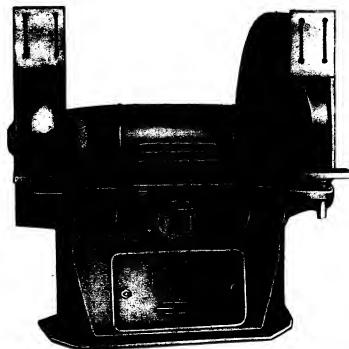
#### SPECIFICATIONS

Grinding Wheels and Tables		Drive	
Number of grinding wheels .	2	220/380 volt, 3 phase, 50 cycle	
Dimensions of grinding wheels,		A.C. motor:	
mm:		Power, kW . . . . .	2.8
Diameter . . . . .	400	Speed, r.p.m. . . . .	1500
Face . . . . .	40		
Hole diameter . . . . .	203		
Height - floor to center line of		Space Occupied	
wheel spindle, mm . . . . .	850	Floor space, mm . . . . .	900 × 600
Distance between grinding		Height of machine, mm . . . . .	1200
wheels, mm . . . . .	700		
Working surface of table, mm . . . . .	150 × 80	Weight	
Grinding wheel speed, r.p.m. . . . .	1398	Net weight, kg . . . . .	approx. 450



#### DOUBLE-ENDED DISC GRINDER

MODEL 3 M 636



The 3 M 636 Double-Ended Disc Grinder is designed for snagging and cleaning castings, forgings, etc. The machine is provided with two tables, one for each grinding wheel.

The large wheel spindle is mounted on ball bearings and is driven by a motor housed in the base of the machine through a Vee-belt drive and two-step pulleys.

The motor is mounted on a plate which is provided with screw adjustment to easily regulate the tension of the Vee-belts used on the drive. Truing of the grinding wheels is performed by a dresser mounted in a special device.

Starting and stopping of the machine is through a push-button station mounted on the front of the machine base.

The machine is provided with safety hoods constructed of welded steel plate.

СТАНКОИМПОРТ

СТАНКОИМПОРТ

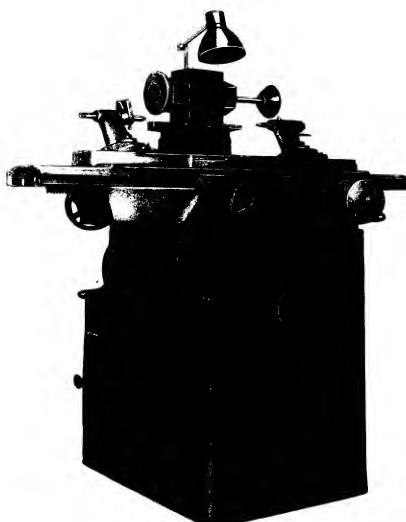
**SPECIFICATIONS**

Grinding Wheels and Tables		Drive	
Number of grinding wheels .	2	220/380 volt, 3 phase, 50 cycle	
Dimensions of grinding wheels, mm:		A. C. motor:	
Diameter . . . . .	600	Power, kW . . . . .	7
Face . . . . .	75	Speed, r.p.m. . . . .	
Hole diameter . . . . .	305		
Height, floor to center line of work spindle, mm . . . . .	850	Space Occupied	
Distance between grinding wheels, mm . . . . .	1000	Floor space, mm . . . . .	1280 × 750
Maximum weight of work, piece, kg . . . . .	30	Height of machine, mm . . . . .	1340
Working surface of table, mm . . . . .	200 × 110	Weight	
Grinding wheel speeds, r.p.m. . . . .	955 and 1425	Net weight, kg . . . . .	approx. 830



## **UNIVERSAL CUTTER AND TOOL GRINDING MACHINE**

MODEL 3 A 64



The 3 A 64 Universal Cutter and Tool Grinder is designed for sharpening cutting tools, such as: reamers, taps, twist drills, counterborers, radial and tangential chasers, milling cutters, hobs, gear shaper cutters, etc.

СТАНКОИМПОРТ

СТАНКОИМПОРТ

Cylindrical, surface and internal grinding can also be performed on this machine.

Sharpening and grinding of tools are accomplished by means of standard and special attachments. The attachments are mounted on the table which is traversed by hand.

The machine may be operated from the front or either side with equal ease and accuracy.

The table and wheel head have swivel movement.

Two grinding wheels of different shape can be mounted on the ends of the spindle.

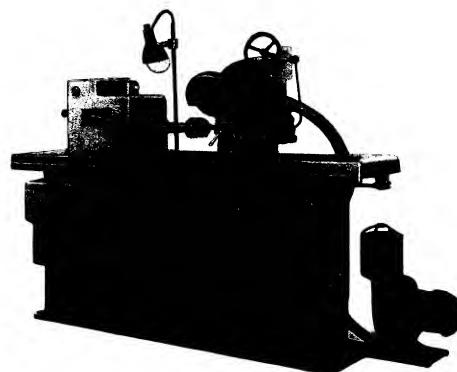
#### SPECIFICATIONS

Capacity		Maximum swivel of wheel head . . . . .	270°
Height of centers	125		
Distance between right- and left-hand footstock centers, mm	650	Grinding wheel spindle speeds, r. p. m. . . . .	3730: 5600
Distance between footstock and work head centers, mm	400		
<b>Table</b>			
Working surface of table, mm	920 × 134	220/380 volt, 3 phase, 50 cycle	
Maximum movement of table, mm:		A. C. motors:	
Longitudinal . . . . .	400	Power, kW . . . . .	0.65
Cross . . . . .	230	Speed, r. p. m. . . . .	3000
Maximum swivel of table + 90°: -30°			
<b>Wheel Head</b>			
Maximum vertical movement of wheel head, mm:			
Above center of work . . . . .	150	Floor space, mm . . . . .	1700 × 1460
Below center of work . . . . .	55	Height of machine, mm . . . . .	1600
<b>Weight</b>			
		Net weight, kg . . . . .	approx. 1000



## AUTOMATIC HOB GRINDING MACHINE

MODEL 3A 642



The 3 A 642 Automatic Hob Grinder is designed for sharpening straight or helical gashed hobs.

The working cycle of the machine (except loading and unloading of the hob) is fully automatic. The automatic cycle includes: traverse of table with hob; indexing of hob in accordance with the number of hob gashes; rotation of hob during grinding to provide the required helix angle of gash; circumferential hob feed and its disengagement after a given amount of stock is removed (pilot light is provided).

The machine is equipped with a special attachment for truing the grinding wheel.

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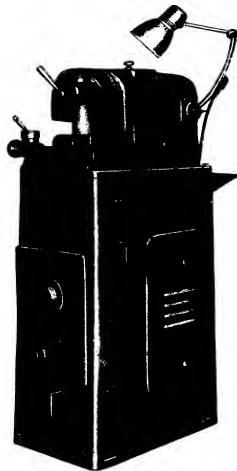
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**SPECIFICATIONS**

<b>Capacity</b>			
Height of centers above table, mm	135	Maximum speed of table traverse, m/min. . . . .	10
Distance between centers, mm	500	Circumferential hob feeds (referred to 76 mm hob dia.), mm per revolution of hob . . . . .	0.01; 0.02; 0.03
Maximum diameter of hob that can be sharpened, mm	200		
Maximum face of hob, mm	200		
Number of hob gashes . . . . .	8; 9; 10; 12		
Helical gash leads, mm	2500 and higher		
<b>Table</b>			
Maximum longitudinal table traverse, mm . . . . .	400	220/380 volt, 3 phase, 50 cycle	
<b>Wheel Head</b>			
Grinding wheel dimensions, mm . . . . .	200 × 13 × 32	A.C. motors:	
Inclination of wheel spindle axis . . . . .	15°	Grinding wheel:	
Maximum swivel of wheel head . . . . .	+ 25°	Power, kW . . . . .	1.7
Maximum vertical travel of grinding wheel, mm . . . . .	150	Speed, r.p.m. . . . .	3000
<b>Speeds and Feeds</b>			
Speed of grinding wheel, r.p.m. . . . .	3000	Indexing mechanism:	
		Power, kW . . . . .	0.1
		Speed, r.p.m. . . . .	3000
<b>Space Occupied</b>			
		Hydraulic pump:	
		Power, kW . . . . .	2.8
		Speed, r.p.m. . . . .	1500
		Floor space, mm . . . . .	2065 × 945
		Height of machine, mm . . . . .	1655
<b>Weight</b>			
		Net weight, kg . . . . .	approx. 1700

**TWIST DRILL GRINDING MACHINE**

MODEL 3Б652



The 3Б652 Twist Drill Grinder is designed for grinding right- and left-hand twist drills.

The surface of the ground drill point forms a cone with an axis at a constant angle of 45° to the drill axis, both these axes not being crossed.

The ground cone surface is formed by hand rotation of the drill holder spindle about its own axis.

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The machine can be advantageously applied for grinding drills with various point and helix angles. Each lip of the drill is ground in consecutive order by hand turning the drill clamped in a drill holder through an angle of 180°. The amount of stock removed per setting does not exceed 0.1 mm. The grinding wheel spindle, in addition to a constant speed rotary motion, has a reciprocating motion which is required to secure uniform wear of the grinding wheel face.

The longitudinal and cross movements of the work slide as well as forward and reverse rotation of the drill holder spindle are hand operated.

To grind left-hand drills, a special chuck is mounted on the slide.

The spindle of the machine is driven by a separate motor.

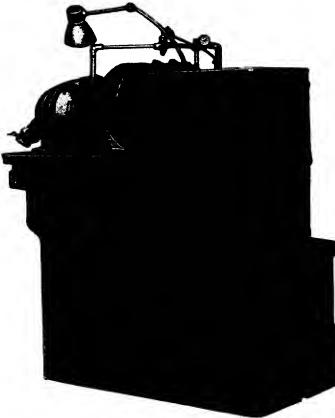
#### SPECIFICATIONS

Capacity	Drill Holder	
Diameter of drill ground, mm:		
Minimum . . . . .	3	Maximum angle drill holder . . . . .
Maximum . . . . .	15	Spindle can be rotated . . . . .
Point angle:		
Minimum . . . . .	90°	Swivel of drill holder column . . . . .
Maximum . . . . .	140°	70° ± 25°
Speeds		
90°	Speed of grinding wheel . . . . .	
140°	Spindle, r.p.m. . . . .	4000
	Speed of grinding wheel reciprocating motion, strokes per minute . . . . .	17.5
Grinding Wheel		
Maximum diameter of grinding wheel, mm:		
Width of grinding wheel, mm:	125	Drive
Maximum length of spindle reciprocating motion, mm . . . . .	16	220 380 volt, 3 phase, 50 cycle
Slide		A.C. motor:
Maximum travel of slide, mm:		Power, kW . . . . .
Along spindle axis . . . . .	40	0.65
Normally to spindle axis . . . . .	60	Speed, r.p.m. . . . .
For depth of cut . . . . .	0.1	3000
Space Occupied		
	Floor space, mm . . . . .	730 × 650
	Height of machine, mm . . . . .	1270
Weight		
	Net weight, kg . . . . .	approx. 350



## AUTOMATIC TWIST DRILL GRINDING MACHINE

MODEL 3659 A



The 3659 A Automatic Twist Drill Grinder is designed for grinding right-hand twist drills and three- and four-lip core drills.

Grinding is effected by bevel surface of the grinding wheel and is carried out in five combined motions:

rotary motion of drill clamped in chuck;  
planet motion of grinding wheel spindle in plane perpendicular to wheel axis;

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oscillating motion of grinding wheel spindle in direction parallel to its axis;

feeding drill to grinding wheel in direction parallel to spindle axis;

rotary motion of grinding wheel.

All the motions are performed automatically. The first three motions are synchronized and serve for forming clearance angles. The second motion, in addition, serves for uniform wear of the grinding wheel.

Grinding double angle point drills can be carried out in this machine as well.

The machine is driven by a motor installed inside the base of the machine.

#### SPECIFICATIONS

##### Capacity

Diameter of drills and core	For grinding three-lip	30
drills ground, mm:	For grinding four-lip	
Minimum . . . . .	core drills	32.5
Maximum . . . . .	Speed of oscillating motion	
of grinding wheel spindle,	of grinding wheel spindle,	
Range of drill point angles . . .	stroke per revolution	94.5
70—140°	Number of automatic feeds	8
Range of clearance angles . . .	Automatic feed per lip ground	
6—17°	(at beginning of working	
Angle of double angle point	cycle), mm:	
drills ground . . . . .	Minimum	0.005
Number of lips ground . . . . .	Maximum	0.04
2, 3 and 4		
Holes directions of drill flutes		
ground . . . . .		
right-hand		
Maximum stock removed per		
one automatic cycle, mm . . .		
2.5		

##### Drive

220/380 volt, 3 phase, 50 cycle

A.C. motors:

Main drive:	
Power, kW . . . . .	2.8
Speed, r.p.m. . . . .	1500
Coolant pump:	
Power, kW . . . . .	0.125
Speed, r.p.m. . . . .	3000

##### Space Occupied

Floor space, mm . . . . . 1475 × 780

Height of machine, mm . . . . . 1530

##### Weight

1850

45 Net weight, kg . . . . . approx. 995

##### Speeds and Feeds

Grinding wheel speed, r.p.m.

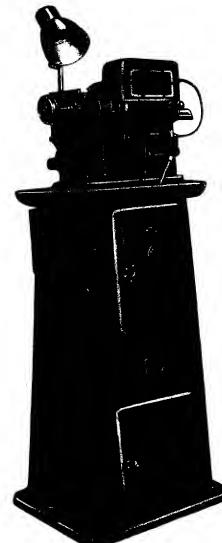
Chuck speeds, r.p.m.

For grinding drills . . . . .



## FINE MODULE HOB GRINDING MACHINE

MODEL 3660



The 3660 Hob Grinder is designed for sharpening fine module hobs with straight gashes, as well as disc milling cutters.

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The machine is arranged for sharpening fine module hobs with 10, 12 and 14 gashes. For hobs with other number of gashes a corresponding index plate should be mounted on the work spindle of the machine.

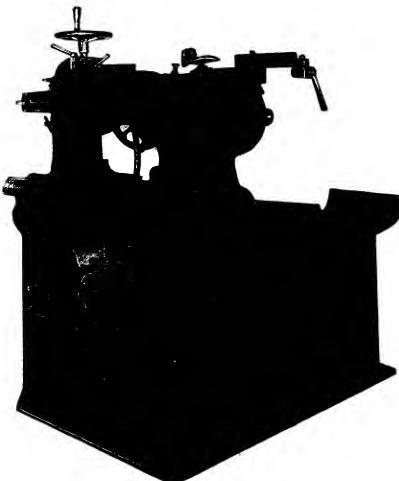
#### SPECIFICATIONS

Capacity	Speeds		
Maximum diameter of hob that can be sharpened, mm	45	Speed of grinding wheel, r.p.m.	6000
Maximum face of hob, mm	30	Speed of wheel head traverse, mm/min.	
Number of teeth that can be sharpened (at corresponding index plate):		Minimum	790
Minimum	6	Maximum	2760
Maximum	90		
Distance between wheel and work spindle axes, mm:	40	Drive	
Minimum	40	220/380 volt, 3 phase, 50 cycle	
Maximum	60	A.C. motors:	
		Power, kW	0.25
		Speed, r.p.m.	1500
Wheel Head	Space Occupied		
Traverse of wheel head along work axis, mm:	30	Floor space, mm	490 × 465
Minimum	50	Height of machine, mm	1220
Maximum	75		
Diameter of grinding wheel, mm	Weight		
Work Spindle	3 50'	Net weight, kg	approx. 170
Angular movement of work spindle per revolution of planetary mechanism disc			



#### AUTOMATIC FACE MILLING CUTTER GRINDING MACHINE

MODEL 3667



The 3667 Cutter Grinder is designed for grinding face milling cutters up to 700 mm in diameter with a maximum blade length of 120 mm. The cutter to be ground is mounted on the work head spindle and the grinding wheel on the grinding head spindle. The wheel head has a reciprocating motion

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along the tooth cutting edge. The working cycle of the machine is completely automatic. It is only necessary to clamp the cutter to be ground, the machine goes through the operations of indexing and grinding each tooth in succession until the cutter is completely and accurately ground.

The work head feed is effected continuously until a very small grinding stock is left. The feed is then diminished and after reaching the predetermined depth of grinding it is automatically disengaged.

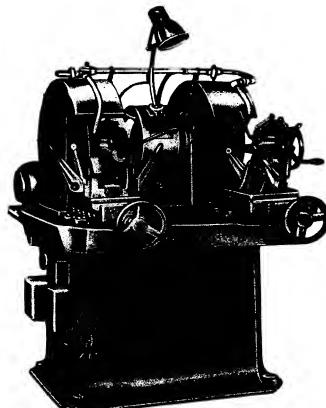
#### SPECIFICATIONS

<b>Capacity</b>		Wheel head table strokes per minute:	
Diameter of face cutter ground, mm:		Minimum	24
Minimum	100	Maximum	38
Number of teeth which can be ground:		Range of work head table feeds, mm per revolution of cutter	
Minimum	700	0.02—0.20	
Maximum	48		
Length of blade which can be ground, mm	120		
<b>Wheel Head and Table</b>		220-380 volt, 3 phase, 50 cycle	
Maximum wheel head travel on table, mm:		A.C. motors:	
Wheel head table travel, mm:		Grinding wheel feed:	
Minimum	550	Power, kW	1.0
Maximum	73	Speed, r.p.m.	3000
Grinding wheel spindle swivel	154	Table movement:	
	± 30°	Power, kW	1.0
		Speed, r.p.m.	1500
<b>Work Head and Table</b>		<b>Space Occupied</b>	
Work head table travel, mm	330	Floor space, mm	1590
Work head rotation through	± 90°	Height of machine, mm	1240
<b>Speeds and Feeds</b>		<b>Weight</b>	
Grinding wheel spindle speed, r.p.m.	2860	Net weight, kg	approx. 1500



#### ROCK DRILL SHARPENING MACHINE

MODEL 367



The 367 Rock Drill Sharpening Machine is designed for sharpening chisel single-edged and four-edged drilling bits.

A spindle for bit clamping and a hand feed mechanism are provided at both sides of the machine.

When sharpening a four-edged bit the latter is automatically indexed through an angle of 90° after its full withdrawal from the grinding wheel.

The machine is equipped with a separate electric motor.

The spindle is driven through a Vee-belt drive.

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**SPECIFICATIONS****Capacity**

Diameter of grinding wheel,  
mm . . . . .  
Slide travel, mm . . . . .  
Automatic indexing of four-edged bit  
Swivel of four-edged bit  
spindle at circumference  
sharpening . . . . .  
Swivel of chisel single-edged  
bit spindle at circumference  
sharpening . . . . .

**Drive**

500	220/380 volt, 3 phase, 50 cycle
145	A. C. motor:
90°	Power, kW . . . . .
	2.7
	Speed, r. p. m. . . . .
	1500

**Space Occupied**

± 10°	Floor space, mm . . . . .	1200 × 1500
0—15°	Height of machine, mm . . . . .	1500

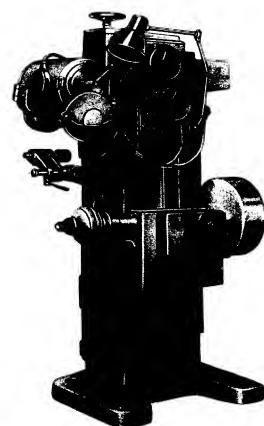
**Weight**

1070	Net weight, kg . . . . .	approx. 1200
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## **CIRCULAR SAW SHARPENING MACHINE**

MODEL 3692



The 3692 Saw Sharpening Machine is designed for accurate face sharpening and back-cutting of the teeth of circular saws.

Alternate low and high teeth with a double level grind on the top of the teeth can be also performed in this machine.

The machine is of massive, rigid construction insuring a steady smooth action in bringing the grinding wheel into contact with the saw teeth.

The grinding head moves up and down and the grinding action when sharpening the tooth is by the plunge-cut method.

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When grinding by this method, each tooth is fed to grinding position and the saw then remains stationary while the face of tooth is being ground, and then the next tooth is fed to position and the operation repeated.

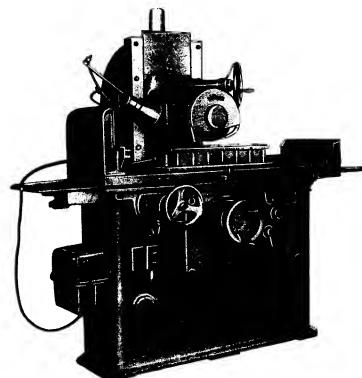
The saw arbor is fitted to an adjustable slide.

The working cycle of the machine is fully automatic.



## HYDRAULIC SURFACE GRINDING MACHINE

MODEL 371 M 1



<b>SPECIFICATIONS</b>	
<b>Capacity</b>	<b>Feeds</b>
Diameter of circular saws, mm:	Range of saw arbor slide feeds, mm per one revolution of saw . . . . .
Minimum . . . . .	300
Maximum . . . . .	1200
Number of circular saw teeth which can be sharpened:	0—0.25
Minimum . . . . .	56
Maximum . . . . .	240
<b>Wheel Head</b>	<b>Drive</b>
Grinding wheel dimensions, mm:	220/380 volt, 3 phase, 50 cycle
Diameter . . . . .	A.C. motor:
Face . . . . .	Power, kW . . . . .
Hole diameter . . . . .	Speed, r.p.m. . . . .
Maximum swivel of wheel head . . . . .	0.65
Range of wheel head strokes, mm:	3000
Minimum . . . . .	200
Maximum . . . . .	10
<b>Saw Arbor Slide</b>	<b>Space Occupied</b>
Maximum slide travel, mm . . . . .	Floor space, mm . . . . . 1765 × 900
	Height of machine, mm . . . . . 740
	12
	4
	500
	Net weight, kg . . . . . approx. 1050
	Weight

The 371 M 1 Surface Grinding Machine is designed for grinding with the periphery of the wheel plane surfaces of parts held on working surfaces of the table or magnetic chuck.

Both the longitudinal table traverse and the cross feed of the wheel head are operated either hydraulically or by hand.

The vertical feed of the wheel head (for depth of grinding) is accomplished by hand and is adjusted in accordance with the graduations of the hand-wheel dial.

The machine is equipped with three electric motors.

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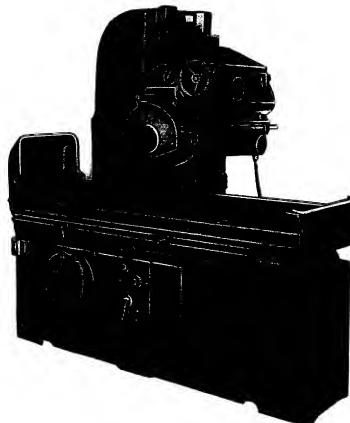
**SPECIFICATIONS**

<b>Capacity</b>		Table speeds (hydraulic), m/min.
Maximum dimensions of work ground (length × width × height), mm . . . . .		Minimum . . . . . 0 Maximum . . . . . 18
600 × 200 × 300		
<b>Work Table</b>		Wheel head column intermittent cross feed (hydraulic), mm per stroke:
Working surface of table (length × width), mm . . . . .		Minimum . . . . . 0.2 Maximum . . . . . 2
Table traverse (hydraulic), mm:		
Minimum . . . . . 100		
Maximum . . . . . 650		
Distance from spindle axis to table surface, mm:		
Minimum . . . . . 65		
Maximum . . . . . 425		
<b>Wheel Head</b>		Drive
Maximum gross travel of wheel head (by hand and hydraulically), mm . . . . .		220/380 volt, 3 phase, 50 cycle A.C. motors:
Maximum vertical travel of wheel head (by hand), mm . . . . .		Wheel head (built in motor): Power, kW . . . . . 2.8 Speed, r.p.m. . . . . 3000
Grinding wheel dimensions, mm:		Hydraulic pump: Power, kW . . . . . 1.7 Speed, r.p.m. . . . . 1000
Minimum diameter . . . . . 130		Coolant pump: Power, kW . . . . . 0.125 Speed, r.p.m. . . . . 3000
Maximum diameter . . . . . 250		
Face . . . . .		
<b>Speeds and Feeds</b>		<b>Space Occupied</b>
Speed of grinding wheel spindle, r.p.m. . . . .		Floor space, mm . . . . . 2500 × 1590
2870		Height of machine, mm . . . . . 2000
<b>Weight</b>		
2870		Net weight, kg . . . . . approx. 1950



## HYDRAULIC SURFACE GRINDING MACHINE

MODEL 372 B



The 372 B Surface Grinding Machine is designed for precision grinding plane surfaces of parts held on working surfaces of the table or magnetic chuck.

Both the longitudinal table travel and the cross feed of the wheel head are hydraulically actuated; the cross feed of the wheel head may also be operated by hand.

The cross feed of the grinding wheel may be set so as to operate at each table reversal or continuously. The amount of intermittent cross feed is con-

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trolled by a hand wheel, the speed of continuous feed by a hydraulic control valve. The vertical feed of the wheel head is accomplished by hand. The amount of vertical feed is indicated on a fine feed dial or on a handwheel dial. The machine is equipped with three motors.

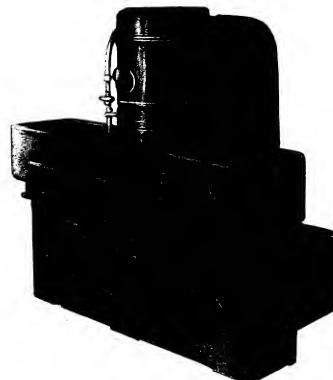
#### SPECIFICATIONS

Capacity	Table speeds (hydraulic), m/min.	
Maximum dimensions of work ground, mm:	Minimum . . . . .	3
Length . . . . .	Maximum . . . . .	30
Width . . . . .	Wheel head cross feeds (hydraulic), mm:	
Height . . . . .	400      Minimum . . . . .	30
	300      Maximum . . . . .	30
	Interruption, mm per table stroke:	
	1000      Minimum . . . . .	3
	300      Maximum . . . . .	30
	Table traverse (hydraulic), mm:	Cross feed, mm/min.:
	Minimum . . . . .	Minimum . . . . .
	Maximum . . . . .	Maximum . . . . .
Working surface of table, mm:	200      Minimum . . . . .	500
Length . . . . .	1100      Maximum . . . . .	4500
Width . . . . .	Wheel head vertical feed (hand operated), mm per graduation of dial . . . . .	0.01
Table traverse (hydraulic), mm:		
Minimum . . . . .		
Maximum . . . . .		
Distance, spindle axis to working surface of table, mm:		
Minimum . . . . .		
Maximum . . . . .		
Work Table		
Working surface of table, mm:		
Length . . . . .		
Width . . . . .		
Table traverse (hydraulic), mm:		
Minimum . . . . .		
Maximum . . . . .		
Distance, spindle axis to working surface of table, mm:		
Minimum . . . . .		
Maximum . . . . .		
Wheel Head		
Maximum movement of wheel head, mm:		
Cross, hydraulic and hand operated . . . . .		
Vertical, hand operated . . . . .		
Grinding wheel dimensions, mm:		
Minimum diameter . . . . .		
Maximum diameter . . . . .		
Face . . . . .		
Hole diameter . . . . .		
Speeds and Feeds		
Grinding wheel spindle speed, r.p.m. . . . .		



## HYDRAULIC VERTICAL SPINDLE SURFACE GRINDING MACHINE

MODEL 373



The 373 Hydraulic Vertical Spindle Surface Grinding Machine is designed for accurate and rapid grinding of flat surfaces of parts held on working surfaces of the table or magnetic chuck and is used on a wide variety in both mass and lot production.

The machine has a vertical spindle with a segmental grinding wheel and a reciprocating hydraulically operated table. The table speeds are infinitely variable, and any predetermined slow speed for finish grinding is instantly obtained by means of the table hydraulic control. The length of the table stroke is controlled by adjustable dogs.

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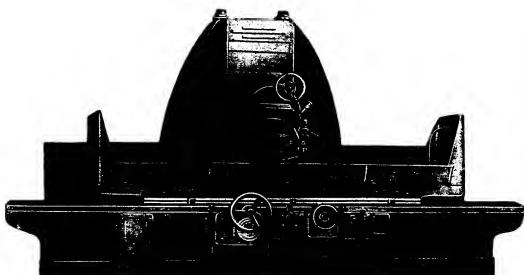
The feed to the wheel head may be applied automatically or by hand.

A wheel dressing device is mounted on the wheel head. The machine is equipped with direct motor drive, a totally enclosed motor being incorporated in the grinding wheel head, and the oil hydraulic drive to the work table having an independent motor. A separate motor is provided for the cooling system.



## HYDRAULIC SURFACE GRINDING MACHINE

MODEL 3724



### SPECIFICATIONS

Capacity		Table speeds (hydraulic), m/min.:	
Maximum dimensions of work ground, mm:		Minimum . . . . .	3
Length . . . . .	750	Maximum . . . . .	30
Width . . . . .	300	Wheel head vertical feed, mm per stroke of table:	
Height . . . . .	350	Minimum . . . . .	0.01
		Maximum . . . . .	0.1
<b>Work Table</b>			
Working surface of table, mm:			
Length . . . . .	750	220 380 volt, 3 phase, 50 cycle	
Width . . . . .	300	A.C. motors:	
Table traverse (hydraulic), mm:		Wheel head:	
Minimum . . . . .	200	Power, kW . . . . .	10
Maximum . . . . .	1100	Speed, r.p.m. . . . .	1500
<b>Wheel Head</b>			
Maximum vertical movement of wheel head, mm:		Hydraulic pump:	
Number of grinding wheel segments . . . . .	6	Power, kW . . . . .	2.8
Grinding wheel diameter, mm . . . . .	350	Speed, r.p.m. . . . .	1500
<b>Space Occupied</b>			
Floor space, mm . . . . .		Coolant pump:	
Height of machine, mm . . . . .	3450	Power, kW . . . . .	0.125
	2135	Speed, r.p.m. . . . .	3000
<b>Weights</b>			
Grinding wheel spindle speed, r.p.m. . . . .	1450	Net weight, kg . . . . .	approx. 5000

The 3724 Surface Grinding Machine is designed for precision grinding plane surface of parts held on working surfaces of the table or magnetic chuck. The extra heavy base of the machine cast as a single unit is of rigid design and is heavily braced with substantial cross girders. Massive double-column castings rigidly bolted to the rear part of the base and reinforced at the top by a heavy connecting brace make the sturdy support for the wheel head assembly.

Both the longitudinal table travel and the cross feed of the wheel head are hydraulically actuated; the cross feed of the wheel head may also be operated by hand.

The cross feed of the grinding wheel may be set so as to operate at each table reversal or continuously. The amount of intermittent cross feed and speed of continuous feed are controlled by two levers.

The vertical feed of the wheel head is accomplished by hand. The amount of vertical feed is indicated on a hand wheel dial.

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Work can be ground to very close limits of accuracy by means of a small vernier dial with graduation in 0.0025 mm.

The wheel head has a power-operated raising and lowering device.

The machine is equipped with four motors and a motor-generator set for magnetic chuck operation.

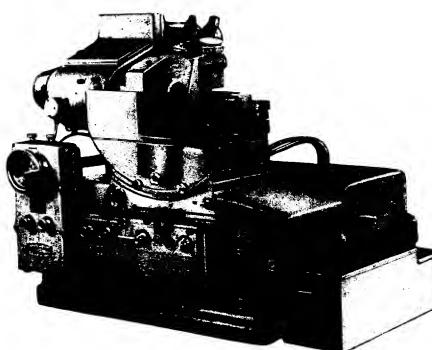


#### SPECIFICATIONS

Capacity	Speeds		
Maximum dimensions of work ground, mm:		Grinding wheel spindle speed, r.p.m.	1450
Length . . . . .	2000	Table speeds (hydraulic), m/min.:	
Width . . . . .	400	Minimum . . . . .	3
Height . . . . .	600	Maximum . . . . .	33
Wheel head intermittent cross feeds (hydraulic), mm per table stroke . . . . .		Wheel head rapid traverse:	
		Power, kW . . . . .	1.1
		Speed, r.p.m. . . . .	1500
Work Table		Hydraulic pump:	
Working surface of table, mm:		Power, kW . . . . .	9.1
Length . . . . .	2000	Speed, r.p.m. . . . .	1000
Width . . . . .	400	Constant pump:	
Table traverse (hydraulic), mm:		Power, kW . . . . .	0.65
Minimum . . . . .	300	Speed, r.p.m. . . . .	3000
Maximum . . . . .	2300	Motor-generator set:	
Wheel Head		Power, kW . . . . .	3.2
Maximum movement of wheel head mm:		Speed, r.p.m. . . . .	1500
Cross . . . . .		D.C. generator, 115/160 volt . . . . .	
Hydraulic . . . . .	500	Power, kW . . . . .	2.6
Hand operated . . . . .	520	Speed, r.p.m. . . . .	1500
Vertical (hand operated) . . . . .	670	Weight	
Wheel head travel per one graduation of dial, mm:		Net weight, kg . . . . .	approx. 17000
Cross . . . . .	0.02		
Vertical . . . . .	0.01		
Wheel head travel per one revolution of hand wheel, mm:			
Cross . . . . .	2.5		
Vertical . . . . .	1		
Grinding wheel dimensions, mm:			
Minimum diameter . . . . .	375	Floor space, min . . . . .	5000 × 2505
Maximum diameter . . . . .	500	Height of machine, min . . . . .	2955
Minimum face . . . . .	60		
Maximum face . . . . .	100		
Hole diameter . . . . .	305		

#### ROTARY SURFACE GRINDING MACHINE

MODEL 3740



The 3740 Rotary Surface Grinding Machine is designed for grinding flat, convex or concave surfaces on a wide variety of parts and assures high precision, perfect finish and maximum production.

It is especially recommended for grinding the faces of piston rings up to 400 mm in diameter.

The machine grinds with the periphery of the wheel, thus producing a concentric finish.

The wheel spindle unit is mounted on a vertically adjustable slide which is supported on the column of the machine. The vertical movement of the wheel slide may be accomplished either manually or hydraulically.

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The work to be ground is held on a rotating magnetic chuck which is carried on a reciprocating table. The rotary motion of the chuck and the reciprocating motion of the table are effected by hydraulic means, thus allowing an infinitely variable range of speeds.

The grinding wheel spindle is driven by a built-in electric motor.

#### SPECIFICATIONS

##### Capacity

Diameter of magnetic chuck, mm . . . . .  
Maximum dimensions of work that can be ground, mm . . . . .  
Diameter . . . . .  
Height . . . . .  
Maximum swivel of table:  
Concave surfaces . . . . .  
Convex surfaces . . . . .  
Maximum travel of wheel slide, mm . . . . .  
Maximum table travel (hydraulic), mm . . . . .  
Grinding wheel dimensions, mm:  
Maximum outside diameter . . . . .  
Hole diameter . . . . .  
Face . . . . .

	Range of table reciprocating speeds (infinitely variable), mm	0.6—4
400	Range of wheel slide power feeds, mm per revolution of chuck . . . . .	0.005—0.03
400		
175		
	Drive	
15°	220/380 volt, 3 phase, 50 cycle	
10	A.C. motors:	
	Grinding wheel spindle:	
205	Power, kW . . . . .	7
	Speed, r.p.m. . . . .	1500
374	Hydraulic pump:	
	Power, kW . . . . .	5
	Speed, c.p.m. . . . .	1000
	Coolant pump:	
350	Power, kW . . . . .	0.15
127	Speed, r.p.m. . . . .	3000
40		

##### Space Occupied

Floor space, mm . . . . . 2250 × 1585  
Height of machine, mm . . . . . 1800

##### Weight

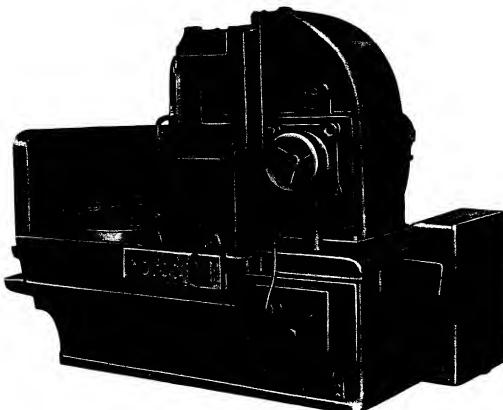
40—210 Net weight, kg . . . . . approx. 3750

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## VERTICAL ROTARY SURFACE GRINDING MACHINE

MODEL 3756



The 3756 Single Spindle Rotary Table Vertical Surface Grinding Machine is used on a wide variety in both mass and lot production. The work is laid on a rotary magnetic chuck and the table is moved horizontally to bring its center under the face of the cylinder wheel. In this position the chuck rotates continuously while the wheel head is gradually and automatically fed downward until the desired size of the work is reached. Size may be determined by setting an automatic feed stop.

The main motor is built into the wheel head.

The compact and rigid construction of the machine gives the necessary support to wheel and work. Finely finished and accurate surfaces, both as to size and as to flatness, are produced by the machine. Rapid production is another point in favour of the machine.

The machine is equipped with five motors.

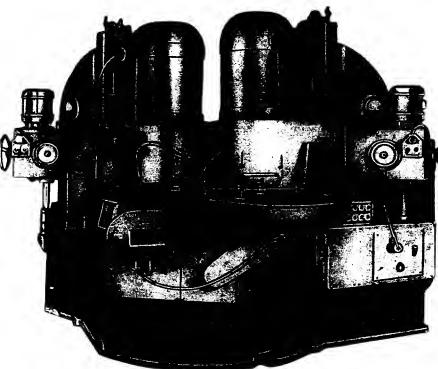
#### SPECIFICATIONS

Capacity			
Distance, table top to bottom of grinding wheel, mm:			
Minimum . . . . .	0	Wheel head vertical feeds, mm/min. . . . .	0.16—1.6
Maximum . . . . .	360	Table longitudinal rapid traverse speed, mm/min. . . . .	3.9
Distance, center line of spindle to column ways, mm:	384	Wheel head vertical rapid speed, mm/min. . . . .	0.6
Maximum dimensions of work ground, mm:			
Height . . . . .	350	220/380 volt, 3 phase, 50 cycle A.C. motors:	
Diameter . . . . .	750	Wheel head:	
Table		Power, kW . . . . .	2.8
Magnetic chuck diameter, mm		Speed, r.p.m. . . . .	1000
Maximum longitudinal travel of table, mm	550	Table longitudinal movement:	
Magnetic chuck power, W	600	Power, kW . . . . .	2.8
D.C. voltage, V	110	Speed, r.p.m. . . . .	1000
Drive		Chuck rotation:	
Wheel Head		Power, kW . . . . .	2.8
Maximum vertical travel of wheel head (mechanically and by hand), mm	450	Speed, r.p.m. . . . .	1000
Vertical travel of wheel head per one graduation of dial, mm	0.01	Wheel head movement:	
Grinding wheel dimensions, mm:		Power, kW . . . . .	2.8
External diameter . . . . .	450	Speed, r.p.m. . . . .	1000
Internal diameter . . . . .	380	Conical wheel:	
Maximum height . . . . .	150	Power, kW . . . . .	0.65
Minimum height . . . . .	35	Speed, r.p.m. . . . .	3000
Speeds and Feeds		Space Occupied	
Grinding wheel speed, r.p.m.	975	Floor space, mm . . . . .	2600 × 1565
Magnetic chuck speeds, r.p.m.	5; 7; 10; 14; 20; 28	Height of machine, mm . . . . .	2330
		Weight	
		Net weight, kg . . . . .	approx. 7300



## AUTOMATIC TWO SPINDLE ROTARY SURFACE GRINDING MACHINE

MODEL 3772Э



The 3772Э Automatic Rotary Surface Grinder is designed for the continuous surface grinding of a very wide range of ferromagnetic workpieces in both mass and large lot manufacture.

The workpieces pass in succession underneath two grinding wheels for rough and finish stock removal in selected steps to close tolerances in size, flatness and finish. Thus, the work is completely processed in one pass through the machine.

The working cycle of the machine is completely automatic, once the work is loaded on the feeding table. Conveying the workpieces from the feeding

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table to the magnetic chuck, rough and finish face grinding, measuring the work size, compensation for wheel wear, unloading and demagnetizing of work are all performed by the machine automatically.

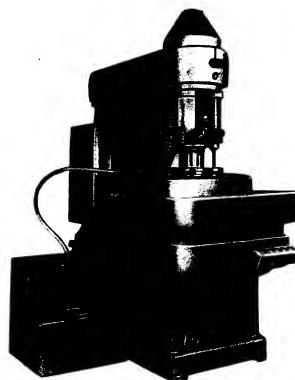
The machine is equipped with a washing attachment; this is to wash work as it comes from the Automatic Grinder.

#### SPECIFICATIONS

<b>Capacity</b>	Wheel head movement per one revolution of dial, mm . . . . .			
Dimensions of work ground, mm:		1.5		
Work must lie within two circles, diameter . . . . .	660—1000	Speed of grinding wheel spindles, r.p.m . . . . .	975	
Height of work, grinding with demagnetizer and automatic sizer . . . . .	50	Number of magnetic chuck speeds . . . . .	6	
Height of work grinding without demagnetizer and automatic sizer . . . . .	200	Range of magnetic chuck speeds, r.p.m . . . . .	0.24—1.3	
		Speed of wheel head rapid movement, mm/min . . . . .	0.586	
<b>Magnetic Chuck</b>				
Inner diameter of magnetic chuck, mm . . . . .	660	220 380 volt, 3 phase, 50 cycle A.C. motors:		
Outer diameter of magnetic chuck, mm . . . . .	1000	Wheel heads (2 motors):		
		Power, kW . . . . .	28	
		Speed, r.p.m . . . . .	1000	
<b>Wheel Heads</b>				
Number of wheel heads . . . . .	2	Work table:		
Grinding wheel dimensions, mm . . . . .		Power, kW . . . . .	2.8	
External diameter . . . . .	450	Speed, r.p.m . . . . .	1000	
Internal diameter . . . . .	250			
Maximum height . . . . .	125			
Maximum vertical travel of wheel head (automatically and by hand), mm . . . . .	200			
Wheel head movement per one graduation of dial, mm . . . . .	0.01			
		Space Occupied		
		Floor space, mm . . . . .	2780	2380
		Height of machine, mm . . . . .	2550	
		Weight		
		Net weight, kg . . . . .	approx. 13000	

## VERTICAL HYDRAULIC LAPING MACHINE

MODEL 3816



The 3816 Hydraulic Lapping Machine is designed to produce flat or cylindrical surfaces within extremely close tolerances and with a high degree of finish.

The principal characteristics of the machine which distinguish it from a grinding machine is the movement of the work relative to the laps. By means of a driving mechanism the work is passed along an ever changing, horizontal path between two revolving laps which slightly reduce its size and refine its surface. This action eliminates completely the parallel grain marks in the work surface left by grinding.

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The machine is constructed to use either fine grain cast-iron laps in conjunction with a special emulsion, or abrasive laps in conjunction with a suitable cooling and lubricant fluid.

The upper lap is mounted on a heavy spindle carried in a sliding quill. The drive is through a multiple Vee-belt. The upper lap is counterweighed so that only hydraulic pressure is applied to the work. A stop limits the downward position of the upper lap. One motor drives both the upper and the lower laps and the work.

The machine is equipped with a special device which automatically stops the laps and raises the upper lap when the work is finished. The arrangements of the machine for flat or cylindrical work are slightly different.

When lapping flat workpieces the workholder receives a combined rotation and eccentric movement. When cylindrical work are lapped the workholder drive is disengaged and the difference in speeds of the rotating laps through frictional contact with the work causes the workholder to rotate about a stationary vertical pin set eccentrically with the lap axis.

A special truing device trues the upper and lower abrasive lap faces.

#### SPECIFICATIONS

<b>Capacity</b>			
Maximum diameter or thickness of work to be lapped, mm	95	Workholder speeds, r.p.m.	11.5; 22
Maximum length of work to be lapped, mm	160	Rapid axial movement of upper lap spindle, mm/min.	2.25
<b>Laps</b>			
Diameter of laps, mm:		<b>Drive</b>	
External	600	220/380 volt, 3 phase, 50 cycle	
Internal	305	A.C. motors:	
Cast-iron laps:		Main drive:	
Min.	33	Power, kW . . . . .	7.0
Maximum	53	Speed, r.p.m. . . . .	1500
Abrasive laps:		Hydraulic pump:	
Min.	23	Power, kW . . . . .	1.0
Maximum	63	Speed, r.p.m. . . . .	1000
Maximum upper lap spindle axial movement, mm:		Coolant pump:	
Hydraulic	148	Power, kW . . . . .	0.15
By hand	225	Speed, r.p.m. . . . .	3000
<b>Space Occupied</b>			
		Floor space, mm . . . . .	2145 × 1700
		Height of machine, mm . . . . .	2320
<b>Speeds</b>		<b>Weight</b>	
Upper lap speeds, r.p.m.	53; 102	Net weight, kg . . . . .	approx. 4300
Lower lap speeds, r.p.m.	58; 112		



#### TOOL LAPING MACHINE

MODEL 3818



The 3818 Tool Lapping Machine is designed for lapping various types of sharpened carbide tipped tools.

Lapping is done by a disc made of special cast iron charged with paste compound.

Diamond dust, boron carbide, carborundum, etc. are used as lapping materials.

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The tool to be lapped is placed on the swiveling table of the machine and lapped by hand.

The lapping disc is driven by a separate electric motor through a belt drive, a worm gearing and a flexible coupling.

A reservoir with kerosene intended for wetting the lapping disc is located in the upper part of the disc guard.

In conditions of mass production when a great number of similar tools are to be lapped it is recommended to use special fixtures for lapping the faces and back flanks of the tools.

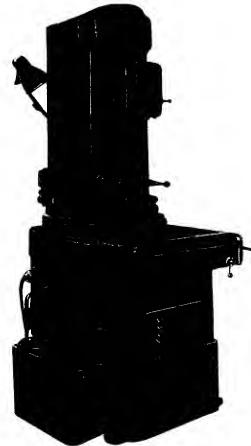
#### SPECIFICATIONS

Capacity	Drive			
Diameter of lapping disc, mm	275	220/380 volt, 3 phase, 50 cycle		
Height of disc center over table, mm	20	A.C. motor		
Size of tools to be lapped, mm:		Power, kW	0.65	
Minimum	6 × 6	Speed, r.p.m.	1500	
Maximum	40 × 40			
Table	Space Occupied			
Swivel of table + 30°: -10°	Floor space, mm	735 × 590		
	Height of machine, mm	1265		
Speeds				
Speed of disc, r.p.m.	80	Weight		
Circumferential speed of disc, m/sec.	1.15	Net weight, kg	approx. 270	



#### VERTICAL SINGLE SPINDLE HYDRAULIC HONING MACHINE

MODEL ОФ-20



The ОФ-20 Vertical Honing Machine is designed for the honing bores in various workpieces of cast iron, unheat-treated and hardened steel.

Extreme precision and fine surface finish in bores are obtained by the following combined simultaneous motions: rotary motion of the tool, reci-

procating motion of the spindle head and continuous oscillation of the tool spindle relative to the spindle head of an amplitude varying from 0 to 4 mm.

The machine is provided with a device for adjusting the honing time.

The machine cycle is completely automatic, and is distinguishable for high output.

It is designed primarily for mass and large lot production.

#### SPECIFICATIONS

Capacity		Drive	
Distance, spindle axis to column ways, mm . . . . .	78	220/380 volt, 3 phase, 50 cycle	A.C. motors:
Distance, end of spindle to working surface of table, mm . . . . .	405	A.C. motors:	Spindle rotation:
Minimum . . . . .	405	Power, kW . . . . .	Power, kW . . . . .
Maximum . . . . .	655	Speed, r.p.m. . . . .	1.0
Maximum diameter of bore honed, mm . . . . .	50	Hydraulic feed of spindle head:	1500
Maximum travel of spindle head, mm . . . . .	250	Power, kW . . . . .	1.7
Speeds and Feeds		Speed, r.p.m. . . . .	1500
Number of spindle speeds . . . . .	3	Constant power:	
Spindle speeds, r.p.m. . . . .	310; 500; 780	Power, kW . . . . .	0.125
Range of spindle reciprocating speeds, m/min. . . . .	0—12	Speed, r.p.m. . . . .	3000
Number of complete oscillations of spindle per min. . . . .	270		
Size of oscillations, mm . . . . .	0—4		

#### Space Occupied

Floor space, mm . . . . . 885 x 795

Height of machine, mm . . . . . 1900

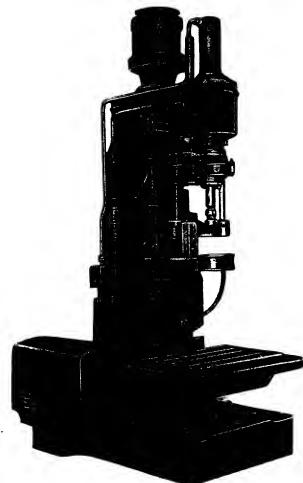
#### Weight

Net weight (without set-ups), kg . . . . . approx. 1000



## VERTICAL SINGLE SPINDLE HYDRAULIC HONING MACHINE

MODEL 383



The 383 Hydraulic Honing Machine is designed for the honing of a wide variety of parts and especially for cylinders of internal combustion engines, including automobile, Diesel and airplane engines, cylinder liners, tractor motor sleeves, etc. Honing is accomplished by simultaneous rotation and

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reciprocation of the hone abrasives under pressure in the bore. The heavy cast-iron base provides rigid foundation for the machine and a large reservoir for the coolant.

The rigid box-section cast-iron column has accurately machined ways and maintains accurate alignment of spindle.

Separate motors are used for rotations and for reciprocations of the spindle. The rotation and reciprocation of the hone may be started and stopped independently of each other.

A vertical motor mounted on the top of the machine and an enclosed gear box provide three changes of spindle speeds. These changes are instantly obtained by a conveniently placed lever. Readily accessible pick-off gears, supplied as extra equipment, provide means for changing the rate of spindle speeds. A hydraulic cylinder provides balanced hydraulic pressure for reciprocating the hone steadily and reversing direction of movement without shocks, so necessary in obtaining a high degree of accuracy. The reciprocating speeds are infinitely variable through adjustment of a feed control valve. A single lever controls all the hydraulic movements of the spindle, including gradually lowering the hone, reciprocating, return up stroke and stopping.

A conveniently located push-button station provides accurate control of the electrical system for starting and stopping the spindle.

A motor driven pump and filtering device furnish a copious flow of clean coolant to the work bore during the honing operation.

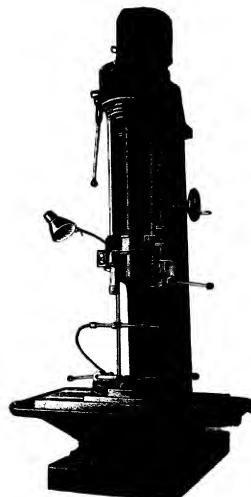
#### SPECIFICATIONS

Capacity		Standard spindle speeds, r.p.m. . . . .	114; 180: 284
Diameter of bore honed, mm:			
Minimum . . . . .	85	Spindle reciprocating speeds, m/min.: . . . . .	
Maximum . . . . .	160	Minimum . . . . .	0
<b>Spindle and Table</b>			
Reciprocating travel of spindle, mm:		220/380 volt, 3 phase, 50 cycle	
Minimum . . . . .	60	A.C. motors:	
Maximum . . . . .	450	Spindle rotation:	
Distance, center of spindle to face of column, mm:	350	Power, kW . . . . .	10
Distance spindle to plain rail- ing seat table, mm:		Speed, r.p.m. . . . .	1500
Minimum . . . . .	175	Hydraulic pump:	
Maximum . . . . .	1075	Power, kW . . . . .	4.5
Taper in spindle . . . . .	Morse No. 4	Speed, r.p.m. . . . .	1000
Working surface of plain rail- ing . . . . .	750 × 480	Coolant pump:	
Vertical travel of plain rail- ing table, mm . . . . .	450	Power, kW . . . . .	0.125
<b>Speeds</b>			
Number of spindle rotation speeds . . . . .	3	Speed, r.p.m. . . . .	3000
<b>Weight</b>			
Net weight, kg . . . . .	approx. 2450		



## VERTICAL SINGLE SPINDLE HONING MACHINE

MODEL 3A 833



The 3A 833 Internal Honer is a mechanically actuated machine designed for honing a wide variety of parts and especially for reconditioning after service cylinders of internal combustion engines, including automobile, Diesel

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and airplane engines, cylinder liners, tractor motor sleeves, etc. Honing is accomplished by simultaneous rotation and reciprocation of the hone abrasives under pressure in the bore.

The heavy cast-iron base provides rigid foundation for the machine and a reservoir for the coolant. The rigid box-section cast-iron column maintains accurate alignment of spindle.

An electric motor mounted behind the column is used for rotations and for reciprocations of the spindle. The rotation and reciprocation of the hone may be started and stopped independently of each other.

An enclosed gear box provides three changes of spindle speeds. These changes are instantly obtained by a conveniently placed lever. The reciprocating motion of the spindle is produced mechanically through a screw and two friction clutches. The spindle stroke is easily set by means of adjustable dogs.

A conveniently located push-button station provides accurate control of the electrical system for starting and stopping the spindle. A motor-driven pump and filtering device furnish a copious flow of clean coolant to the work bore during the honing operation. The machine is supplied with a fixture for securing tractor motor sleeves.

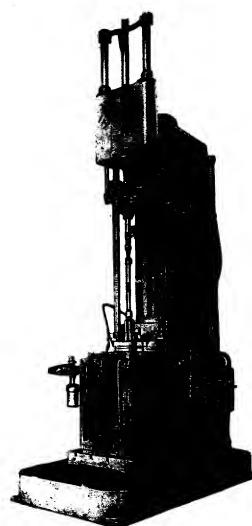
#### SPECIFICATIONS

<b>Capacity</b>		Spindle speeds, r.p.m. . . . .		125: 185: 259
Maximum diameter of bore honed, mm	165	Spindle reciprocating speed, m/min.	. . . . .	7.5
Maximum length of bore honed, mm	470			
<b>Spindle and Table</b>				
Maximum vertical travel of spindle, mm	420	Drive	220/380 volt, 3 phase, 50 cycle	
Distance, center of spindle to face of column, mm	300	A.C. motors:	Main drive: Power, kW . . . . . 4.5 Speed, r.p.m. . . . . . 1500	
Distance from top of spindle to top of table, mm:		Coolant pump:	Power, kW . . . . . 0.125 Speed, r.p.m. . . . . . 3000	
Minimum . . . . .	640			
Maximum . . . . .	1050			
Taper in spindle . . . . . Morse No. 4				
Working surface of table, mm	1900 × 450	Space Occupied	Floor space, mm . . . . . 1270 × 1215	
			Height of machine, mm . . . . . 2900	
<b>Speeds</b>				
Number of spindle rotation speeds	3	Weight	Net weight, kg . . . . . approx. 1600	



#### VERTICAL SINGLE SPINDLE HYDRAULIC HONING MACHINE

MODEL 384



The 384 Hydraulic Honing Machine is designed for the honing of a wide variety of parts and especially for long or heavy cylinders of internal com-

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bustion engines, including automobile, tractor and Diesel engines, cylinder liners, tractor motor sleeves, etc. The machine successfully hones bores up to 160 mm diameter and 1100 mm long.

Honing is accomplished by simultaneous rotation and reciprocation of the hone within the bore, with the hone abrasives under hydraulically controlled pressure.

The rigid cast-iron column has accurately machined ways and maintains accurate alignment of spindle. Six changes of spindle speeds are provided.

A hydraulic cylinder provides balanced hydraulic pressure for reciprocating the hone steadily and reversing direction of movement without shocks, so necessary in obtaining a high degree of accuracy. The following movements are operated hydraulically: gradually lowering the hone, reciprocating, hone expansion, return up stroke, speed changing and work table travel.

The working cycle of the machine is completely automatic. The automatic cycle includes: gradually lowering the hone, starting spindle rotation and reciprocation, expanding hone feed to the desired bore size, honing without further expansion of hone, hone contraction and lift out.

A short stroking mechanism is provided to remove tapers or to make any desired correction in cylinder bore.

The machine is equipped with a work carrying table moved in and out by means of the hydraulic cylinder. This table serves a convenience for gauging and for reloading.

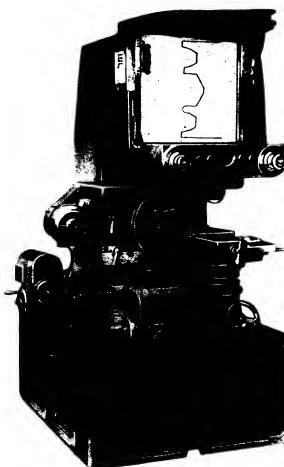
#### SPECIFICATIONS

Capacity		Spindle reciprocating speeds, m/min.	
Diameter of bore honed, mm:			
Minimum . . . . .	65	Minimum . . . . .	0
Maximum . . . . .	160	Maximum . . . . .	15
<b>Spindle and Table</b>			
Reciprocating travel of spindle, mm:		220-380 volt, 3 phase, 50 cycle	
Minimum . . . . .	100	N. C. motors:	
Maximum . . . . .	1200	Spindle rotation:	
Distance, center of spindle to face of column, mm . . . . .	350	Speed, r.p.m. . . . .	7
Distance, spindle to work table, mm . . . . .		Speed, r.p.m. . . . .	1500
Minimum . . . . .	1205	Hydraulic pump:	
Maximum . . . . .	2425	Power, kW . . . . .	4.5
Taper in spindle . . . . . Morse No. 5		Speed, r.p.m. . . . .	1000
Working surface of in and out table . . . . .	750 × 750	Coolant pump:	
Horizontal travel of table, mm . . . . .	400	Power, kW . . . . .	0.6
<b>Speeds</b>			
Number of spindle rotation speeds . . . . .	6	Speed, r.p.m. . . . .	3000
Range of spindle speeds, r.p.m. . . . .	75-400	Space Occupied	
		Floor space, mm . . . . .	2350 × 1260
		Height of machine, mm . . . . .	4870
		Weight	
		Net weight, kg . . . . .	approx. 7000



#### OPTICAL PROJECTION FORM GRINDING MACHINE

MODEL 395 M



The 395 M Optical Projection Form Grinder is a precision machine designed for grinding most accurately every desired profile within its range, directly from the drawing. It is especially suited for the grinding of both circular and flat form tools, templates, profile gauges, cams, dies, etc., from

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hardened materials including tungsten carbide. The machine is not limited by the regularity or irregularity of the work, nor by straight lines, circular or irregular curves.

The machine has a large screen of 500 × 500 mm area on which a layout drawing of the work profile made to scale of 50 to 1 is placed. An optical device projects the work to be ground and the grinding wheel on the screen with a 50× magnification. The work is clamped and squared to the work table, the screen then squared with the work by a simple adjustment, and the wheel is then set to traverse at any required angle by the universal compound adjustments in the wheel head.

The wheel head slides are traversed along the work profile either manually or by power by means of D.C. motors with infinitely variable speeds.

The reciprocating motion of the wheel spindle slide is effected by a motor through a crank mechanism.

#### SPECIFICATIONS

Capacity	Speeds	
Maximum working range, mm:	Grinding wheel speed, r.p.m.	3500
Direct, at one setting of work slides	Wheel head slide speed, mm/min.:	
Indirect, at several settings of work slides by means of gauge blocks	Minimum . . . . .	0.2
150 × 60	Maximum . . . . .	20
Range of wheel spindle slide strokes per min. . . . .	45—85	
Maximum thickness of work accommodated, mm . . . . .	48	
Grinding Wheel and Head	Drive	
Maximum travel of wheel head lower slide, mm . . . . .	220/380 volt, 3 phase, 50 cycle A.C. motors:	
Angular adjustment of wheel head lower slide . . . . .	Grinding wheel:	
Maximum travel of wheel head upper slide, mm . . . . .	Power, kW . . . . .	0.6
Angular adjustment of wheel head upper slide . . . . .	Speed, r.p.m. . . . .	3000
Wheel head angle of tilt, for side clearance . . . . .	Generator set:	
Wheel spindle slide angle of tilt, for front clearance +10° : -30° . . . . .	Power, kW . . . . .	0.6
Minimum diameter of grinding wheel, mm . . . . .	Speed, r.p.m. . . . .	1500
Maximum diameter of grinding wheel, mm . . . . .	Wheel head slide D.C. motor:	
Work Table	Power, W . . . . .	100/80
Work table travel, mm:	Speed, r.p.m. . . . .	2000
Vertical . . . . .		
Longitudinal . . . . .		
Cross . . . . .		
Space Occupied		Weight
	Floor space, mm . . . . .	1485
	Height of machine, mm . . . . .	1800
		2000
	Net weight, kg . . . . .	approx. 1560

#### Vsesojuznoje Exportno-Importnoje Objedinjenije “STANKOIMPORT”

#### EXPORTS AND IMPORTS:

Machine Tools  
 Woodworking Machinery  
 Metal Working Machinery (Presses, Hammers, Shears, Cold Forming Machines, Punching Machines)  
 Rolling Mills (imports)  
 Measuring Instruments and Apparatus (for metal industry)  
 Testing Machines and Instruments (for metals)  
 Optical Instruments and Equipment  
 Portable Electric and Pneumatic Tools (for metal and woodworking)  
 Metal and Wood Cutting Tools  
 Mechanic's Tools and Chucks  
 Sintered Carbide and Hard-Alloy Products  
 Abrasive Products  
 Ball and Roller Bearings  
 Microscopes of all types  
 Motion-Picture Equipment and Accessories  
 Geodetic Instruments and Equipment  
 Photographic Cameras  
 Binoculars  
 Magnifiers  
 Lenses  
 Crude Optical Glass Blocks and Blanks

Design and specifications of the machine tools illustrated herein are subject to change without notice.